

CA1

Z3

-81701

Government
Publications



CONFLICT and OPPORTUNITY
Toward a New Policy
For Canada's Pacific Fisheries

**A PRELIMINARY REPORT
of
THE COMMISSION ON PACIFIC FISHERIES POLICY**

Peter H. Pearce, Commissioner

VANCOUVER - OCTOBER 1981

Copies of this report are available from the office of the Commission on Pacific Fisheries Policy, Suite 603, 1200 West 73rd Avenue, Vancouver V6P 6G5; from the Department of Fisheries and Oceans, Communications Branch, 240 Sparks Street, 7th Floor, West Tower, Ottawa, K1A 0E6, and at the Department's Pacific Region headquarters, Information Branch, 9th Floor, 1090 West Pender Street, Vancouver, V6E 2P1.

This document will be available in French when translation is complete.

The illustration on the front cover is 'The Salmon,' by the Salish artist Stan Green. It depicts the life cycle of the salmon; on the outer rim of the whorl are adult fish, on the inner rim are minnows, and in the centre is an egg.



CONFLICT and OPPORTUNITY ***Toward a New Policy*** ***For Canada's Pacific Fisheries***

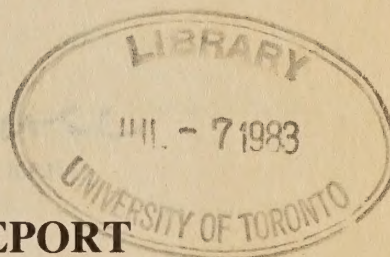
A PRELIMINARY REPORT

of

THE COMMISSION ON PACIFIC FISHERIES POLICY

Peter H. Pearse, Commissioner

VANCOUVER - OCTOBER 1981



COMMISSION ON PACIFIC FISHERIES POLICY

PETER H. PEARSE: COMMISSIONER

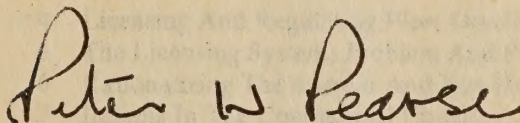
His Excellency the Right Honourable Edward Schreyer, P.C., C.C.
Governor General of Canada

MAY IT PLEASE YOUR EXCELLENCY

In accordance with your Order-in-Council of the twelfth day of January of this year, a Commission was issued under the Great Seal of Canada pursuant to the Inquiries Act. That Commission appointed me sole Commissioner to inquire into and report upon certain matters of fisheries policy as they apply to Canada's Pacific coast, and to submit a preliminary report with recommendations concerning commercial fishing privileges.

I beg to submit my preliminary report herewith.

I have the honour to be, Sir, your
Excellency's obedient servant.

A handwritten signature in dark ink, reading "Peter H. Pearse". The signature is fluid and cursive, with the first name "Peter" and last name "Pearse" clearly legible.

Peter H. Pearse, B.S.F., M.A., Ph.D., R.P.F.
Commissioner

Vancouver
October, 1981

His Excellency the Right Honourable Edward Schreyer, P.C.

Governor General of Canada

MAY IT PLEASE YOUR EXCELLENCY

In accordance with your Order-in-Council of the twelfth day of January of this year, a Commission was issued under the Great Seal of Canada pursuant to the Fisheries Act. That Commission appointed the said Commissioner to inquire into and report upon certain matters of fisheries policy as they relate to Canada's Pacific

Digitized by the Internet Archive
in 2023 with funding from
University of Toronto

His Excellency's obedient servant

John W. Barker

John W. Barker, B.A., M.A., Ph.D.

Commissioner

Vancouver

October, 1981

Contents

Chapter

Letter of Transmittal iii

Preface vii

1 Toward A New Fisheries Policy 1

Part One — The Resource Base And Its Utilization

2 The Resources 7

3 The Fishing Industry 17

Part Two — Commercial Fisheries

4 Licensing And Regulating Fleet Development 29

5 The Licensing System: Problem And Proposals 37

6 Rationalizing The Salmon And Roe-Herring Fisheries 53

7 Indians In The Commercial Fisheries 65

Part Three — Non-Commercial Fisheries

8 The Indian Fishery 75

9 The Sport Fishery 83

Part Four — Conservation And Development

10 Habitat Management 93

11 Resource Enhancement And Aquaculture 105

Part Five — Management And Administration

12 Fisheries Management 117

13 Administration, Consultation, Enforcement And Research 123

14 Directions of Reform For The Future 133

Appendix A 137

Appendix B 141

Preface

This Commission was appointed by the Governor General in Council of Canada on January 12, 1981. Its terms of reference, reproduced in Appendix A, instruct me, as Commissioner, to investigate and to make recommendations regarding most of the major issues of governmental policy relating to Canada's Pacific fisheries, except for international arrangements. They also require a preliminary report with recommendations on the particular issue of the "...policies and procedures for regulating access to the fisheries and the development of the commercial fishing fleet, and also with the administration of licences and levies for commercial fishing privileges." Accordingly, this preliminary report contains recommendations on licensing and related matters of commercial fishery policy. In addition, it reviews most of the other issues covered by the terms of reference in the light of the Commission's findings to this stage in the inquiry.

The scope of this inquiry includes a wide variety of economic and social issues, as well as problems of resource management and conservation. Many of these are complicated, intertwined, and difficult to unravel. So I decided to use this preliminary report, not only to make the required recommendations on commercial fishing privileges, but also to sketch the dimensions of the other major issues, and to identify some of the avenues of reform which seem, at this stage, to warrant consideration in making my final recommendations. The purpose of this is to focus attention and discussion on the alternatives for policy development during the remainder of this public inquiry.

This interim report is thus a first step toward designing a coherent policy for the Pacific fisheries. It identifies problems and possible ways of coping with them, but generally leaves open the choice among alternative courses of action. A progress report of this kind is unusual for Commissions of Inquiry, but in this case it seems to be warranted. My public hearings and other investigations have already been exceedingly productive in identifying the problems that must be resolved, through keen interest and considerable effort on the part of a wide array of organizations and individuals. So I have been able already to delineate many of the shortcomings in fisheries policy and the dimensions of needed reform. By setting these out in this report I hope to move the inquiry forward to address systematically the solutions available to us, to assist in the preparation of my final report.

The problems now facing the Pacific fisheries, reviewed in the chapters that follow, are numerous and grave. They are also very complicated because of the special

characteristics of the fisheries resources and the manner in which they are utilized. As a result their fundamental causes and feasible solutions are often unclear. As one group put it at my public hearings, "The problems in the industry boggle the mind. On every hand there is a crisis and a fundamental problem that must be solved",¹ and words like "dilemma", "predicament" and "chaos" are common.

The evidence already assembled has led me to conclude that major and fundamental changes in fisheries policy are needed in order to alleviate the current resource management problems and economic stress now besetting the fisheries. Even more radical reforms will be needed to achieve the broader policy objective, stated in the Commission's terms of reference, of ensuring "...that fish resources and their use make the highest possible contribution to the economic and social development of the people of Canada". For this Commission to fulfill its task, and indeed for it to meet the expectations of those who are participating in this inquiry, it must assist in the formulation of a coherent long-term strategy for fisheries resource management, development and use. This kind of articulate long-term policy has hitherto been lacking.

To design an appropriate policy for the future, and to implement it successfully, the cooperative participation of those who will be most directly affected by it is essential. A Commission of Inquiry of this kind is well suited to initiate this involvement in policy-making. The participants in the public hearings raised many of the problems, including those related to the condition of the resources, the provisions for management and enhancement, the structure and size of the commercial fleets, the Indian fishery, sportfishing, and administration and enforcement, among other things. They have also helped to broaden appreciation of the problems faced by various groups that often find themselves opposed to each other. But I am concerned that the alternative possible reforms, of the fundamental kind apparently needed, have not been subjected to systematic scrutiny by all or even most of the groups concerned.

This is not to say that participants in the inquiry have been unwilling to suggest new approaches. Many have done so, and their proposals have ranged from matters of detail to wholesale reorganization of the fisheries. But past policies have had the inadvertent effect of generating a great deal of conflict among groups involved in the fisheries, and this has fostered defensive and protective attitudes which have impeded open-minded consideration of the full range of long-term policy alternatives. I perceive, nevertheless, that there is now a widespread recognition that major changes are required if fish resources are to be preserved and their full benefits realized. This preliminary review, published in this inexpensive form for wide circulation, is intended to stimulate more focused and systematic debate on the form these changes should take.

The information in this report has been obtained in a variety of ways, most importantly by the Commission's public hearings. These were advertised throughout British Columbia and the Yukon; anyone who wished to make a presentation on the matters within the terms of reference were invited to do so by the end of February. Hearings were then scheduled in coastal and interior centres to meet, as far as possible, the convenience of participants with respect to location and dates.

The list of registered participants in the public hearings (see Appendix B) consists of 171 individuals and organizations, representing a wide range of interests. Virtually all commercial and sportfishing organizations, of which there are a remarkable number, have participated, as have many Indian tribal councils and bands, environmental groups, professional associations of biologists and foresters, industrial organizations, governmental agencies and companies involved not only in the fisheries but also in forestry and mining. But the largest group of participants are individuals, who have brought a wide variety of viewpoints to bear on the issues under investigation.

By the time this preliminary report was written, the Commission had received and discussed 139 written submissions in 42 days of public hearings, held in 10 centres in British Columbia. The examination of these briefs and related testimony has been compiled in 9397 pages of verbatim transcript. Not all the registered participants have yet been heard; the large number of submissions and the necessity that I prepare this preliminary report required postponement of some presentations until later.

The public hearings have been conducted with fewer formalities than is usual in an inquiry such as this. Each participant has been required to submit his written brief in advance to enable me, my staff, and other participants to study it and prepare questions. This has avoided the need to read each brief at the hearings themselves and provided a greater opportunity for critical examination and discussion. In order to broaden participation in the inquiry I have also held informal meetings in some of the smaller communities where there is a significant interest in fisheries. These informal community meetings have been held in fourteen towns and villages along the coast and in the interior, many of them Indian communities. These less-structured discussions have contributed a great deal to my understanding of local problems as well as the implications of more general policy issues I am required to examine.

Information has been obtained from a variety of sources other than these hearings and meetings. The Commission has employed a number of specialists to gather data and to analyse certain problems. As well, I have received a good deal of information and assistance from the Department of Fisheries and Oceans, the Government of British Columbia, and international regulatory commissions. I have also taken advantage of the considerable number of studies and reports that the Department itself has compiled in recent years, as well as academic and other published documents.

The Commission's heavy schedule of public hearings and meetings, in addition to our internal investigations, has been strenuous. The degree of participation in this inquiry has been greater than anticipated, and I am pleased that the government agreed to an extension of the deadline for submission of this preliminary report.

Several recent events have aggravated the deep-rooted problems of fisheries and the difficulty of the Commission's task. Although this season has seen a better salmon catch than expected, it follows two depressed years for the commercial fishery generally. Early this year, in the face of certain pressing resource management problems, the Department of Fisheries and Oceans announced a series of new restrictions on commercial and sport fishing. The ensuing debate over these measures, and the way they were implemented, heightened concern about fisheries policy. At the same time, Canada's important negotiations with the United States over a new international accord, relating mainly to interceptions of Pacific salmon, faltered and raised new apprehensions. And in recent months several industrial development projects have generated public controversies over their impacts on fish habitat. All these events occurred against a background of growing concern about the precarious condition of many of our fish stocks, increasing anxiety among Indians about their traditional fishing rights and among sport fishermen about their recreational opportunities, and adverse economical trends in the fishing industry.

In spite of all these stresses, this Commission has enjoyed remarkable cooperation from those with interests in the fisheries. I am deeply indebted to the participants not only for the obvious effort they have taken in preparing helpful submissions but also for their enthusiastic cooperation in the hearing process, which has made it congenial as well as efficient in eliciting helpful information and advice. Others who have followed the Commission's activities, like myself, have been impressed by the high standard of the briefs presented and the constructive discussion of contentious issues at our hearings.

I cannot begin to acknowledge all those who have contributed to this inquiry. I am hesitant to single out any, but two groups, the United Fishermen and Allied Workers Union and the Pacific Trollers Association, not only made extensive submissions but also participated almost continuously throughout the public hearings. The well-informed questioning of other witnesses by the representatives of these organizations, combined with that of many other participants, has proven exceedingly helpful in eliciting information.

The Commission has also enjoyed the full cooperation and assistance of the Department of Fisheries and Oceans. At my request the Department has prepared a number of background papers on particular aspects of fisheries policy, and officials of the Pacific regional office have responded with consistent helpfulness to our many requests for information. This preliminary report is not the place to acknowledge the continuing work of the Commission's staff and special advisors, but the inquiry could not have proceeded as expeditiously as it has, nor could this report have been prepared as quickly, without their extraordinary effort and enthusiasm.

In the following chapters I have drawn heavily on the information and advice I have received from participants in my public hearings and meetings. But for the most part I have refrained from attributing particular positions to particular parties, because to do so consistently and fairly would have required far too much qualification and explanation. Many individuals and organizations will nevertheless recognise their ideas here, and I acknowledge their contributions with gratitude.

I have not been able to deal in this preliminary report with all the issues that fall within the broad scope of this Commission's terms of reference. Some of the exclusions are substantial. I do not discuss, for example, the special problems of the Yukon Territory; I intend to visit the Yukon within a few months, and to review the policies applied there in my final report. I touch only superficially on the problems of the fish processing sector and of marketing fish products. And there are many other matters that require much more investigation during the next few months.

In the face of all the problems currently beleaguering the Pacific fisheries, we must not become so preoccupied with immediate difficulties that we lose sight of our considerable long-term opportunities. Our resources are remarkably rich; indeed they are enviable in comparison to those of most other fishing regions. And while some stocks are depressed, they are generally in much better condition than heavily exploited resources in much of the rest of the world.

Our predominant resource, the Pacific salmon, is truly exceptional: it is one of the world's most highly valued food fish; it affords superb recreational opportunities; and its bountiful migrations throughout the coast and far into the waterways of the interior has made it the touchstone of many of the native Indians' cultural and spiritual traditions. In addition to all this, it is remarkably responsive to enhancement.

Salmon is not our only rich fishing resource. Herring have proven to be extremely valuable, and so have many stocks of groundfish, shellfish and other minor species. That the people of Canada have not hitherto gained much net economic benefit from commercial exploitation of these rich resources is paradoxical and disturbing. It is a sad commentary on our past policies that some stocks have deteriorated, and the manner of their exploitation developed in such a way that the potential benefits have been dissipated so that the fisheries have become a net burden on Canadian taxpayers.

The economic stresses on the commercial fisheries are not a result of any meagerness of our natural resources. On the contrary, it is because they are so rich that they have attracted so much wasteful investment in surplus fishing capacity.

Many of our other problems, too, can be traced to the abundance of our natural resources. Our rivers, which support our most valuable stocks of fish, also offer some of the best hydroelectric opportunities on the continent. They drain valleys which

support the finest timber in Canada. They run through mountains rich in mineral deposits, and empty into coastal inlets that provide ports opening to the markets of the Pacific and the world. And our landscape and climate attract settlement and tourists. All this other natural wealth affords opportunities for economic development which, when exploited, impinge adversely on our fish resources.

Our goal is to enable our fisheries to realize their full potential contribution to the economic and social welfare of Canadians. Designing a policy that will facilitate our reaching that goal from our present intractable position will likely be difficult. As a well-known expert put it somewhat pessimistically, "Maybe you can't get there from here."² But I am optimistic that a way can be found and that, with sufficient dedication and cooperation from those involved, we can begin to realise more fully the substantial benefits our natural resources offer.

Peter H. Pearse

Vancouver

FOOTNOTES

1. Exhibit # 76, p. 8.
2. P.A. Larkin, Maybe you can't get there from here: a foreshortened history of research in relation to management of Pacific salmon, Journal of the Fisheries Research Board of Canada, (36). Ottawa, 1979, p.98-106.

CHAPTER 1

Toward A New Fisheries Policy

"Canada's West Coast fishing industry is in the depths of one of the deepest crises ever."

UNITED FISHERMEN AND ALLIED WORKER'S UNION¹

One thing is clear: there is an urgent need for a comprehensive policy to chart the course for the future development of Canada's Pacific fisheries. Among the most consistent criticisms voiced at the hearings and meetings has been that fisheries management and administrative arrangements are not just faulty in particular respects, but are often contradictory, unclear and most of all, lacking in long-term objectives.

This concern is typified by one participant's complaint that

The myriad of special problems that are facing the Pacific fisheries today . . . have arisen from a lack of policy and firm practices.

The solutions have not yet been identified, to some extent because of resistance by all parties to review openly the obvious flaws exposed by past and present experiences. The present disarray on the Pacific Coast of Canada is so extreme that the fundamental issues must now be examined, and major solutions identified. We are convinced that such solutions are available, and that they must be implemented in a very short period of time. A commitment is required from all participants to make the necessary and perhaps painful adjustments if the total industry is to recover from its present circumstances.²

Clearly, this "disarray" must be put in order if the people of Canada are to realize the potential benefits of our rich fisheries resources.

To provide a context for the following discussion of particular issues in the chapters that follow, this first chapter sketches the broad dimensions and requirements of the needed policy. Policy, as the term is used here, refers to the whole complexity of public laws, regulations, institutions, and administrative procedures that govern the way fish are managed and utilized. This obviously includes legislative provisions beyond those aimed directly at fisheries because

government activities relating to such diverse matters as international trade, taxation, native Indians, tourism, unemployment, and industrial and regional development all affect the fisheries in one way or another. Moreover, it is not just the federal government that controls fisheries activities; the Province of British Columbia has jurisdiction over land-based processing and other activities, authority over inland fisheries, and control over the development of lands, forests, minerals and water resources, all of which affect the management of fish. The interplay of all these influences determines how fish resources are managed and used, and that must be considered in a review of fisheries policy.

Fisheries based on sea otters and seals were the earliest industrial activities on the west coast of what was to become Canada. From the beginning, and through nearly two centuries of continuing change and evolution, the Pacific fisheries have been heavily influenced by governmental regulation. Today, the fisheries are probably the most highly regulated industry of those still based almost entirely on private enterprise.

Our present fisheries policy is a legacy of history.³ The present complex regulations, governing virtually every fishing activity, have resulted from a long succession of governmental responses to particular problems at particular times. Regardless of the efficiency of the individual measures in serving their intended purposes, the aggregate result of this piecemeal process, particularly after conditions have changed radically with respect to pressures on the resources, technology, public aspirations and markets, is that the policy is neither coherent nor well suited to modern needs.

Related difficulties have resulted from the necessity of adopting national fisheries policies to deal with widely differing regional circumstances in Canada. Much of the legislation, regulations and administrative structures are designed to deal not only with the Pacific, but also with the Atlantic and inland fisheries. Each of these involves conspicuously different resources and patterns of utilization as well as unique economic, social and political circumstances.

Inevitably, the most appropriate regulatory arrangements for Pacific fisheries will be different from those best suited to the Atlantic fisheries and elsewhere, so national policy must be broad enough to accommodate the special needs of each region.

These difficulties present obstacles to producing a coherent fisheries policy. In fact they, and not simply inaction by the Department of Fisheries and Oceans, are primarily responsible for the lack of reform. Indeed, the last dozen years have seen remarkable changes in the regulation and management of Pacific fisheries, and these changes have often been made despite stiff resistance, tightly constrained legislative powers and strained personnel and resources. But these innovations and adaptations have taken place without a comprehensive policy framework to guide them.

This Commission must examine, from a broad external viewpoint, the existing framework of public regulatory

arrangements affecting the Pacific fisheries, analyse its shortcomings and identify means of improvement. While there have been several Commissions of Inquiry into Pacific fisheries problems in the past, most of them had much narrower terms of reference, and there have been no formal public inquiries of this kind during the last four decades. There has recently been a series of less formal investigations into specific matters, and some have attempted to formulate broad policy objectives, but none has resulted in general redirection of governmental policy as it applies to the Pacific fisheries.⁴

A comprehensive policy for the Pacific fisheries that clearly indicates the long-term objectives of the government is essential if those objectives are to be achieved. Users of the resource, not only commercial operations but also those involved in food and sportfishing activities, need this guidance in order to plan their affairs efficiently. Fisheries authorities must, of course, retain some flexibility because of the unpredictability of fish stocks, economic conditions and other factors, but the uncertainty about regulatory intervention must be minimized and the long-term goals and methods to be used in achieving them made clear.

The uncertainty resulting from the prevailing lack of a coherent fisheries policy is regarded as a serious obstacle to orderly development.

One plea often heard from processors, fishermen, recreational and other interests is for a consistent and long-run policy by government. What government calls "creative ad hocery" in policy formulation continuously frustrates those who are required to make decisions in the investment of their finances and labour in the industry. It is one thing to change the rules of the game and it is quite another to keep moving the goal posts.⁵

A clearly articulated policy is also required to guide the users and regulators of other resources. Because the fish resources of the Pacific coast, particularly salmon, are so influenced by other activities, fisheries objectives must be specified, at least in broad terms, in order to assess whether they can be reconciled with other developmental goals. This is essential, also, for those who manage the fisheries; otherwise they can only guess at the criteria they should use in making decisions, which inevitably leads to inconsistency and criticism. Finally, articulated policy objectives provide the necessary framework for designing appropriate and consistent regulations and administrative procedures.

Guidelines for Policy-Making

An effective fisheries policy must have certain basic characteristics, which can usefully be identified here. The following general features imply broad objectives and can be inferred from the Commission's terms of reference, reproduced in Appendix A.

Resource conservation Fisheries policy must first and foremost ensure that the resource is properly protected and,

whenever advantageous, enhanced. This obviously calls for careful regulation of the level and form of harvesting and, equally important in the context of the Pacific fisheries, for the protection of the freshwater and tidal habitat upon which our major stocks depend. In addition, it implies a need for institutional and financial arrangements to take advantage of opportunities for enhancement. And finally, it requires data and research to ensure that all these activities can be carried out effectively.

Efficiency in utilization Insofar as fish are a valuable economic resource, fisheries policy should ensure that the available harvest yields the maximum possible value. Hitherto, regulation of commercial fishing has allowed much of the value of the catch to be dissipated in the excessive fishing costs associated with overexpanded fleets. These wasteful tendencies must be reversed. In sportfishing and Indian fisheries the values generated are less easily measured, but the values are nonetheless real, and efficiency requires that the fish taken in these ways generate the maximum possible benefits. Efficiency in utilizing resources must also be a primary objective in regulating the processing and marketing of fish products.

Social stability and development Fisheries policy bears heavily on particular social groups and communities, and so it should be designed to promote, or at least permit, the achievement of public objectives with respect to these groups and communities. On the Pacific coast and elsewhere in Canada, social considerations have had a major influence on fisheries policy, especially on methods of allocating fishing privileges.

Purely economic values must sometimes be compromised in deference to social considerations, but social objectives do not usually conflict with the principle of obtaining the highest possible net return on fish products sold or processed. In other respects, where one value is sacrificed for another, it should be done explicitly, carefully, and in the most effective way.

Equity The notion of equity figures more importantly in the fisheries than in most other economic activities mainly because all groups of users are anxious about their share of the common resource. An acceptable fisheries policy must take account of prevailing concepts of fairness in resource allocation, even though they are typically difficult to reconcile one with another and with criteria of efficiency.

Questions of equity also arise with regard to granting fishing rights and imposing conservation measures on particular groups, and with regard to how the economic gains generated by fisheries (the "resource rent") should be divided between the users and the Crown.

New policies imply changes, and changes, however beneficial in the long-run, cannot often be made without adversely affecting some people in the short run. It is, therefore, profoundly important that new policies be designed to minimize dislocation of those who have established positions in the fisheries.

Change is also inevitable. Some fishermen feel such nostalgia for the past that they advocate a return to former practices, older technologies and an earlier way of life. I cannot concur with this view. Although I believe strongly in learning from past experience, in my opinion the fisheries of past decades do not offer a suitable model for the future. Moreover, I see this as the only position consistent with my terms of reference. Our new policies must be forward looking.

Flexibility One of the most conspicuous characteristics of the fisheries, especially the commercial fisheries of the Pacific coast, is their susceptibility to rapid change — change in the resource base, in markets and in fishing technology and effort. Subsequent chapters describe tumultuous change during recent decades: major fisheries have suddenly emerged, others have disappeared, and the fleets have been transformed in their size and structure. Although the forms of future changes are unpredictable, we can reasonably assume that change will continue. It follows that fisheries policy must not be based on the expectation that present circumstances will prevail indefinitely. One of the lessons of the past is that measures that seem adequate to achieve some purpose at a particular time can be overtaken and frustrated by changing events. So policy must be designed to be resilient and durable in the face of continuing shifts in the external environment.

Administrative simplicity Obviously, a successful policy must be amenable to administration and enforcement by public officials. Some forms of regulation depend more heavily on detailed data than others and some put a heavier onus on close regulatory control than others, particularly those that prescribe behaviour contrary to the private economic interests of fishermen. When a choice must be made among alternative approaches to public regulation, choosing those that impose fewer and less complex administrative requirements will usually result in lower costs and greater effectiveness.

These criteria, though admittedly very general, will be important in considering the policy alternatives discussed later in this report. It seems to me important to stress them at the outset in order to help sift through the array of possible choices in addressing the complicated web of policy problems. It must be recognized that these objectives are to some extent contradictory; compromises and trade-offs must be made among them in formulating a comprehensive policy, and these are often the most awkward decisions for policy-makers.

Conflict and Inertia

One of the conspicuous factors of the fisheries is the prevalence of conflict. From its beginnings, the Pacific fisheries have been the source of conflict between various commercial, Indian and recreational user groups, between fisheries interests and other industrial activities, between federal and provincial governments, and between Canada and foreign nations. The continuous conflict can be traced to a number of causes. Undoubtedly, the most important is the common-

property characteristic of the resource, which distinguishes the system of allocating rights in the fisheries from that used to allocate rights in most other natural resource industries. This results in all groups drawing from the same pool of resources and competing to protect and increase their shares. Under pressure from users, the government has often intervened to protect one user group from another, and it can be argued that government has been too willing to respond to such pressures, becoming excessively involved in what some refer to as "people management" at the expense of resource management. The measures taken have sometimes created obstacles to efficient allocation and use of the natural resources, and produced a regulatory morass which cannot be reconciled with any logical long-term objectives. Moreover, few have had the desired result of eliminating conflict for long.

There are other reasons for conflict as well. Some are obvious, such as the inevitable international problem of shared stocks and interceptions, overlapping constitutional responsibilities, and the impact of other industries on the environment that fish depend on. Less obvious is the fact that, apart from brief bursts of prosperity, the fisheries have traditionally been characterized by relatively low incomes and recurrent economic stress. These circumstances focus conflict, especially when the welfare of resource users depends so directly on the activities of others.

The conflicts and pressures that now beset the fisheries, coupled with the intense degree of governmental regulation that has developed, make policy reform all the more difficult. The strains on the system limit the scope for maneuver. Moreover, change is often perceived as a threat to established interests. The strongest resistance to regulatory reform typically comes from the regulated groups because they have adapted themselves to the prevailing system.

The result is a profound inertia in the fisheries, a general resistance to major change. Paradoxically, participants in the fisheries also generally acknowledge that worsening circumstances have made major changes essential. But this consensus is only at the level of generalities; they hesitate when particular proposals are advanced. In this environment of conflict, new ideas, which will have uncertain impacts on different groups, are received with great apprehension.

Conflicts and pressures sometimes result in a preoccupation with assigning blame for past difficulties: in the words of one fisherman, "we spend most of our energy throwing mud at each other."⁶ Others dwell on the faults of the governments. We must recognize that we cannot undo the past; we must turn our attention to the future, concentrating on how we can do better. "... it is time to get on a better track, no matter what seemingly radical changes this may entail."⁷

Canadians on the Pacific coast have a special feeling toward the fisheries, especially salmon, and they undoubtedly want them to be better protected and managed.

When we discuss and manage the fishery — particularly salmon — we are dealing with a certain mystique, an aura surrounding the salmon, that is based on a long and exciting history that all British Columbians and many Canadians feel they understand.

Fishing is a way of life for many British Columbians and has been part of the coastal community for centuries. It formed the backbone of the native Indian food supply and was an early and lasting mainstay of the colonial and provincial economy. Salmon was then and is now an important and fascinating marine resource.

Today many British Columbians continue to earn their living fishing or in fishing-related work. Others are joining a growing number of people who are dependent on the recreational fishery which attracts hundreds of thousands of resident fishermen and tourists seeking their sporting pleasure in the salmon sports fishery.

Yet today we are discussing the fishery as though this valuable and renewable resource, this part of our culture, could disappear. We regard it as being in serious peril and we routinely speak of the "crisis" of the fishing industry.⁸

This Commission has initiated a process of consultation directed toward overcoming the crisis and charting a course for fisheries development for the longer term. This systematic consultation has been widely welcomed and certainly productive, and it is important that it be carried further to resolve the policy choices that must be made.

... it is the establishment of a common interest, collectively viewed, that is paramount. It is the

resolution of conflict and the re-direction of effort toward common interests and goals which will make the system work to the greater benefit of all. Consultation is not the end — it is only one of the means.⁹

These, then, are the circumstances that have persuaded me to produce this preliminary review of the policy issues before this Commission. I believe that major policy change can be made only with support from those most directly affected, and that support hinges on overcoming the prevailing inertia. This report is intended to assist the process in two ways: first, by providing up-to-date information and a more systematic statement of the circumstances and issues than has hitherto been available, and by this means eliminate some of the confusion and misunderstandings that impede constructive debate; second, by identifying broad policy alternatives, and thereby shifting the focus of discussion from preoccupation with problems to the alternative possible solutions.

The next chapter summarizes the Commission's findings so far with respect to the condition of the fish resources on the Pacific coast, and Chapter 3 sketches the structure of the industry based on these resources. Chapters 4, 5, 6 and 7 deal with the regulation of commercial fisheries and contain specific recommendations for improving the structure of fishing privileges and related policies for controlling fleet development. These are the only matters on which firm recommendations are made in this report. Following chapters review the policies for regulating the Indian fishery and sportfishery.

The remaining chapters deal with specific issues in fisheries management, in regulating commercial fishing activity, and in administrative and related matters. The final chapter proposes some broad directions for fisheries policy reform, to be developed further in my final report.

FOOTNOTES

1. Exhibit # 138, "A New Deal for British Columbia's Fisheries," p. 1.
2. Exhibit # 98, p. 1.
3. For an historical account of the evolution of fisheries policy, see *The Public Regulation of the Commercial Fisheries*, a report to the Economic Council of Canada by the Economics Study Group on Fisheries Regulations at the University of British Columbia, 1980. (Publication pending.)
4. A notable example of a recent attempt to reformulate federal fisheries objectives is *Policy for Canada's Commercial Fisheries*, Fisheries and Marine Service, Environment Canada. Ottawa, 1976.
5. Exhibit # 63, p. 37.
6. Exhibit # 123, p. 4.
7. Exhibit # 121, p. 2.
8. Exhibit # 136, p. 1.
9. Exhibit # 91, p. 5.

Part One

The Resource Base And Its Utilization

CHAPTER 2

The Resources

"It is fundamental to the future of all fisheries participants and consumers that protection of the resource be given the highest priority. All other management objectives should be considered secondary to this principle."

NATIVE BROTHERHOOD OF BRITISH COLUMBIA¹

Fisheries policy must begin with the resource base. So it is appropriate that, in the Commission's terms of reference, the first of several issues identified for investigation is "the condition of the stocks of fish within Canada's jurisdiction off the Pacific coast, current levels of utilization and their relationship to optimum rates of use." These matters are not well documented, and the public hearings have revealed a great deal of uncertainty about them, which has sometimes impeded discussion about appropriate policies.

This chapter summarizes the Commission's preliminary findings on these issues. They are in large part the result of investigations sponsored by this Commission and conducted by a team of biologists at the University of British Columbia, who were asked to make an independent assessment of the data relating to stock conditions, trends and yield capabilities. They have assembled the available historical data on catches, escapements and other variables and, with the cooperation of biologists from the Department of Fisheries and Oceans, have analyzed them to infer as much as possible about fish populations and their potentialities. The results sketched in this chapter are preliminary, but I report them here in order to provide a more solid base for future discussion of problems and opportunities.

The quality of the data available for analysis of our fish resources varies a great deal, and in some cases is very weak. For some species we have good historical records of catches and consistent monitoring programs aimed at population assessment. For others, especially some of our salmon stocks, even the historical record of catches is sketchy, and data relating to escapements and other variables necessary to make accurate estimates of stock sizes and productivity are meagre and inconsistent. The estimates of populations and yield capabilities presented in this chapter are supplemented with estimates of ranges within which the true numbers are likely to lie; the breadth of each range reflecting the degree of confidence that may be put on the available data.

The research needed to overcome this inadequacy of information about the resource base is discussed in a later chapter; here it is important to note that in many instances even our best estimates are inevitably imprecise.

TOTAL PRODUCTION AND POTENTIALITIES

The recent catch levels for the important categories of fish off the Canadian Pacific coast and our estimates of their maximum sustainable yields are summarized in Table 2-1. The catch data include the Canadian catch in the commercial, sport and Indian fisheries. The Canadian catch differs from the Canadian production because of significant interceptions by Canadian fishermen of fish produced in United States waters and vice versa.

Table 2-1 Actual and potential catches of the major categories of fish

	units	current annual catch	maximum sustainable yield
salmon ^a	millions of pounds	155	300-360
herring	thousands of metric tons	54	140-200
halibut ^b	millions of pounds	12	15
other groundfish	thousands of metric tons	35	35-105
shellfish and others ^c	millions of pounds	14	24+

^a Includes commercial, sport and Indian harvests.

^b Catch of Canadian fishermen only.

^c 1975-1980 six-year average. Oyster production of 5.65 million pounds is excluded because it is mainly a mariculture product.

Sources: The catch statistics provided were compiled from background papers prepared for this Commission. Maximum sustainable yields were estimated by the Commission's researchers.

The dominance of salmon in Canada's west coast fish production is readily apparent, as is the significant shortfall in the current catch of salmon from potential levels. Herring, which has shown even more erratic levels of production, is second in importance. These two fisheries dominate total production.

While catch statistics indicate that the production of fish, except herring, has remained fairly stable over the past three decades, the composition of the catch has changed markedly: herring production collapsed dramatically and then recovered; there has been a mixed pattern of declines and recoveries among salmon stocks, halibut stocks have declined; and a number of minor fisheries have expanded.

However, it is reckless to draw many conclusions from data at this level of aggregation; they are indicative only of relative magnitudes, providing some perspective on the fisheries as a whole. The remainder of this chapter examines each of the major categories in more detail.

SALMON

The five species of Pacific salmon are by far our most important fishery resources in both size and value. While they have been known by a variety of common names, they are referred to in this report as chinook, chum, coho, pink and sockeye. These five species differ in important respects including their productivity, their dependence on freshwater habitat, their size, behaviour and susceptibility to fishing gear, their longevity, their quality characteristics, and their markets. Steelhead trout are often fished and managed together with salmon and so are included in this discussion.

Salmon have been used by native Indians from time immemorial, and they have supported an industrial fishery for more than a century. Salmon became the region's second export item (after furs) when the Hudson Bay Company began exporting salted salmon from Fort Langley on the Fraser River in 1830. The first commercial canning in British Columbia began in 1870, also on the Fraser River, with the pioneer canners concentrating on red chinook salmon. The first cannery on the Skeena River was established in 1876, on the Nass River in 1889, and others were established in the early 1890's at Bute Inlet, Gardner Canal, Grenville Channel, Namu, Rivers Inlet, Alert Bay, and on the west coast of Vancouver Island.

As the canneries expanded throughout the coast, so did the exploitation of salmon stocks. The early focus on red chinook salmon quickly shifted to sockeye, although it was not until early in the present century that sockeye became widely accepted in export markets and began to command a premium price. This species, whose uniform size was a great advantage in processing, soon dominated the canned salmon pack.

Until 1903 any variety other than "red" salmon — sockeye, chinook or coho — was rejected by the canners. But because salmon runs were poor in 1903, canners began processing the prolific pink and chum salmon. Their use increased sharply in 1911 in response to a disappointing catch of Fraser River sockeye and increased demands for canned salmon. Since then, pinks and chums have held an important place in the commercial salmon fishery.

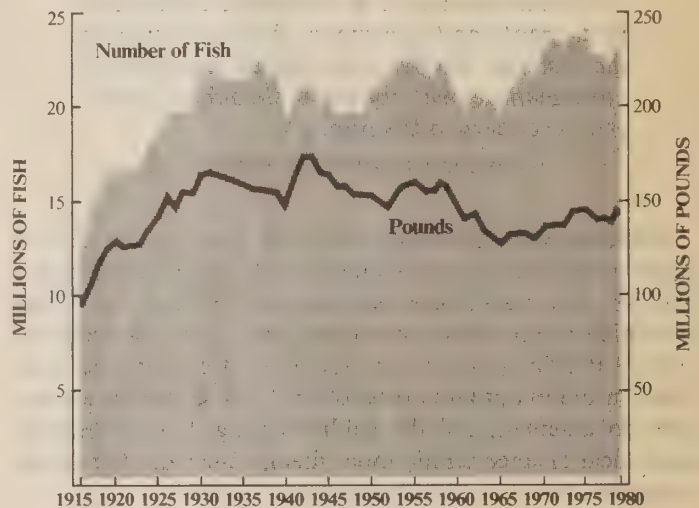
Salmon have continued to be the mainstay of the fishing industry on the Pacific coast. Annual landings over the last decade have averaged 142 million pounds, and have been dominated by pinks (37 million pounds), sockeye (34 million pounds) and chums (31 million pounds). Coho and chinook salmon are caught in smaller quantities in the commercial fishery (23 and 17 million pounds, respectively), but these two species are the base of the important sport fishery. Some 400 to 700 thousand chinook and 700 to 900 thousand coho salmon are now taken annually by sportsmen, (see Chapter 9).

Trends in Stocks

There is considerable controversy about the long-term trends in salmon stocks, which is exacerbated by the dearth

of reliable information. Accurate measurement of the stocks produced in Canadian waters requires adding together the harvests in the commercial fisheries adjusted for interceptions by foreigners and of foreign fish, the catches in the Indian and sport fisheries, and escapements. Even recent data for this purpose are unreliable, and for earlier periods are unavailable. However, some indication of long-term trends can be inferred from the record of commercial landings, which is depicted in Figure 2-1.²

Figure 2-1 Commercial landings of all salmon in numbers of fish and landed weight since 1915, in ten-year averages.^a



^a The figure plotted for each year is the average of landings recorded in that year and the preceding nine years.

Sources: See footnote 4.

Commercial salmon landings by Canadian fishermen since 1915, measured by the number of fish and the number of pounds, are shown in Figure 2-1. Both are plotted (using the best information available) in terms of their moving ten-year average in order to smooth the wide fluctuations between cycles and years.

The numbers of fish landed reveal no distinct long-term trend. Landings in the 1930's averaged just under 20 million fish, and in the 1940's and 1950's just over 20 million. Since then they have increased slightly to average 23 million in the 1960's and 22 million in the 1970's. The rise in the last two decades may be due in part to the more intensive habitat protection and conservation efforts begun in the early 1960's, and the early enhancement projects in the form of fishways, hatcheries and spawning channels.

The historical record of pounds of salmon landed reveals some interesting fluctuations. Average landings were relatively stable during the 1930's, 1940's and 1950's at about 150 million pounds per year. Then a noticeable decline occurred in the 1960's, when the average fell to 137 million pounds. In the 1970's the average recovered to 142 million pounds.

While the number of pounds of fish landed declined, the number of fish landed increased. This can be explained partly by the declining average size of all species taken in the commercial fishery except sockeye.³ This is believed to reflect genetic responses to continuous fishing with nets that tend to take a higher proportion of the larger fish from most stocks. In addition, an increasing proportion of the catch has been taken by troll vessels, which often catch salmon before they are mature.

It has been suggested that around the turn of the century the salmon stocks had a productive capacity in the order of 300 to 360 million pounds. But that capacity was never tested because, by the early 1930's when the fishing industry had expanded so that it was exploiting all species in all areas, some stocks had already been seriously depleted and others, such as those on the Fraser River, had suffered devastating habitat damage.

Historical sizes of the stocks of the five salmon species are difficult to document in any case. In the early years of com-

mercial fishing, the fleets concentrated on the most valuable stocks in the most accessible areas; and when one species or area declined in productivity fishing effort was redirected to another area or another species. The geographical progression of exploitation and the varying intensity of effort directed at various species make the historical record of catches difficult to relate to stock abundance in a meaningful way.

The long-term trends in Figure 2-1 disguise the wide year-to-year fluctuations and divergent trends in individual stocks, but they do not reveal a marked change in the overall production of salmon.

More informative than the trends in catch of all salmon taken together are the trends in catch of individual species. These are indicated in Figures 2-1a to 2-1c, which show the annual landings since 1905. All species show sharp year-to-year fluctuations, and the long-term trends in catch show conspicuous differences among species.

Figure 2-1a Commercial landings of sockeye salmon since 1905.

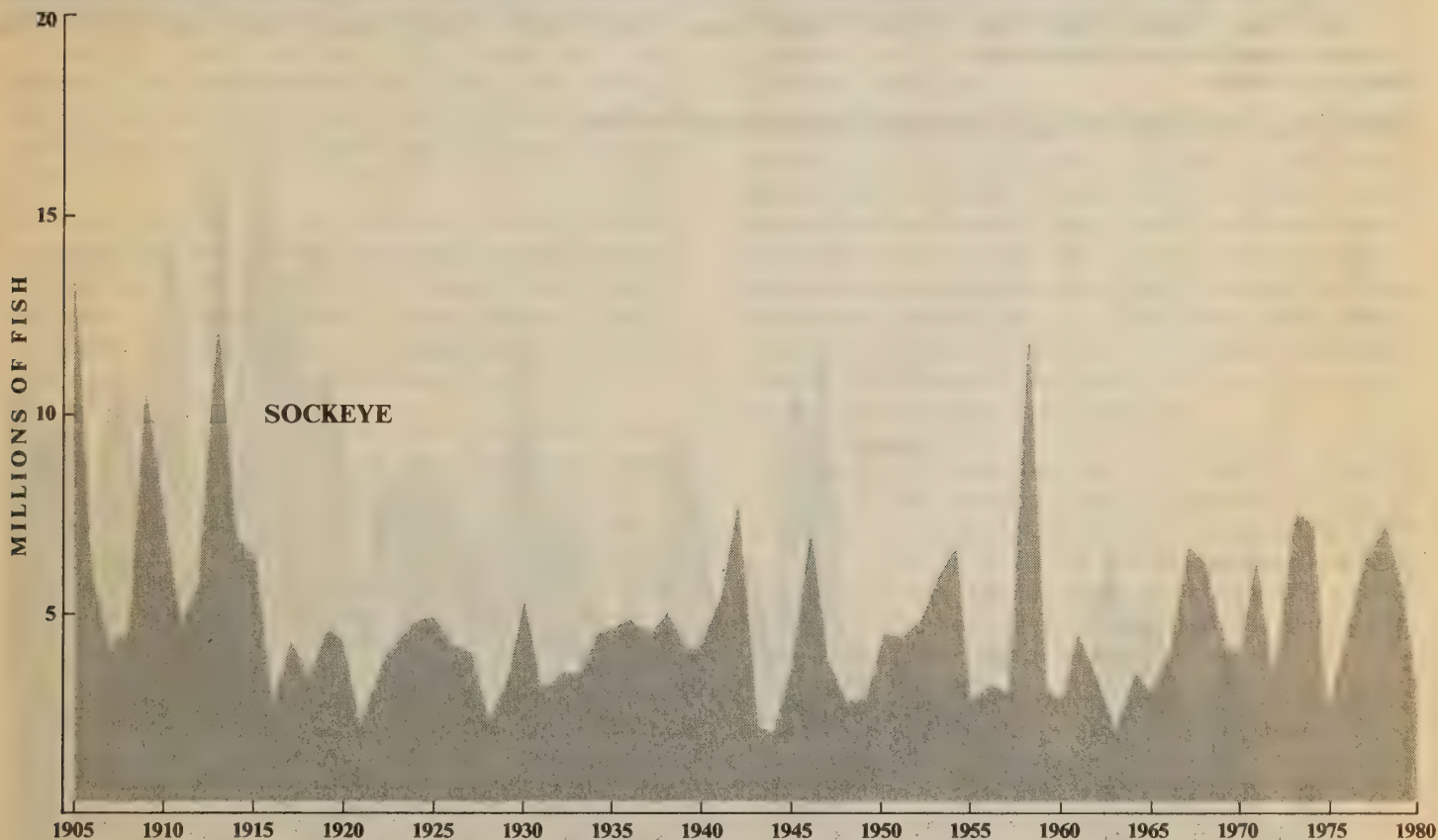
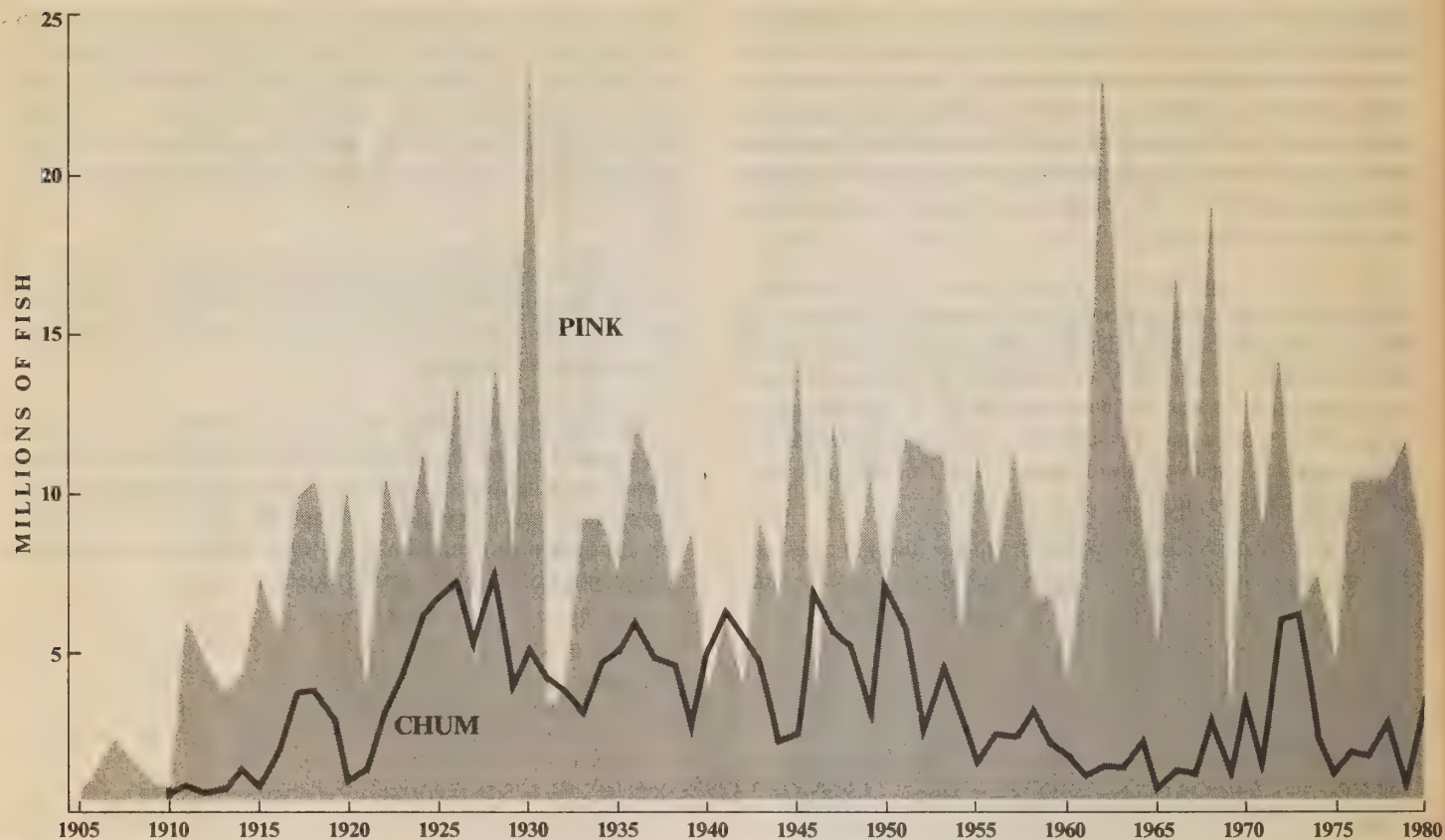
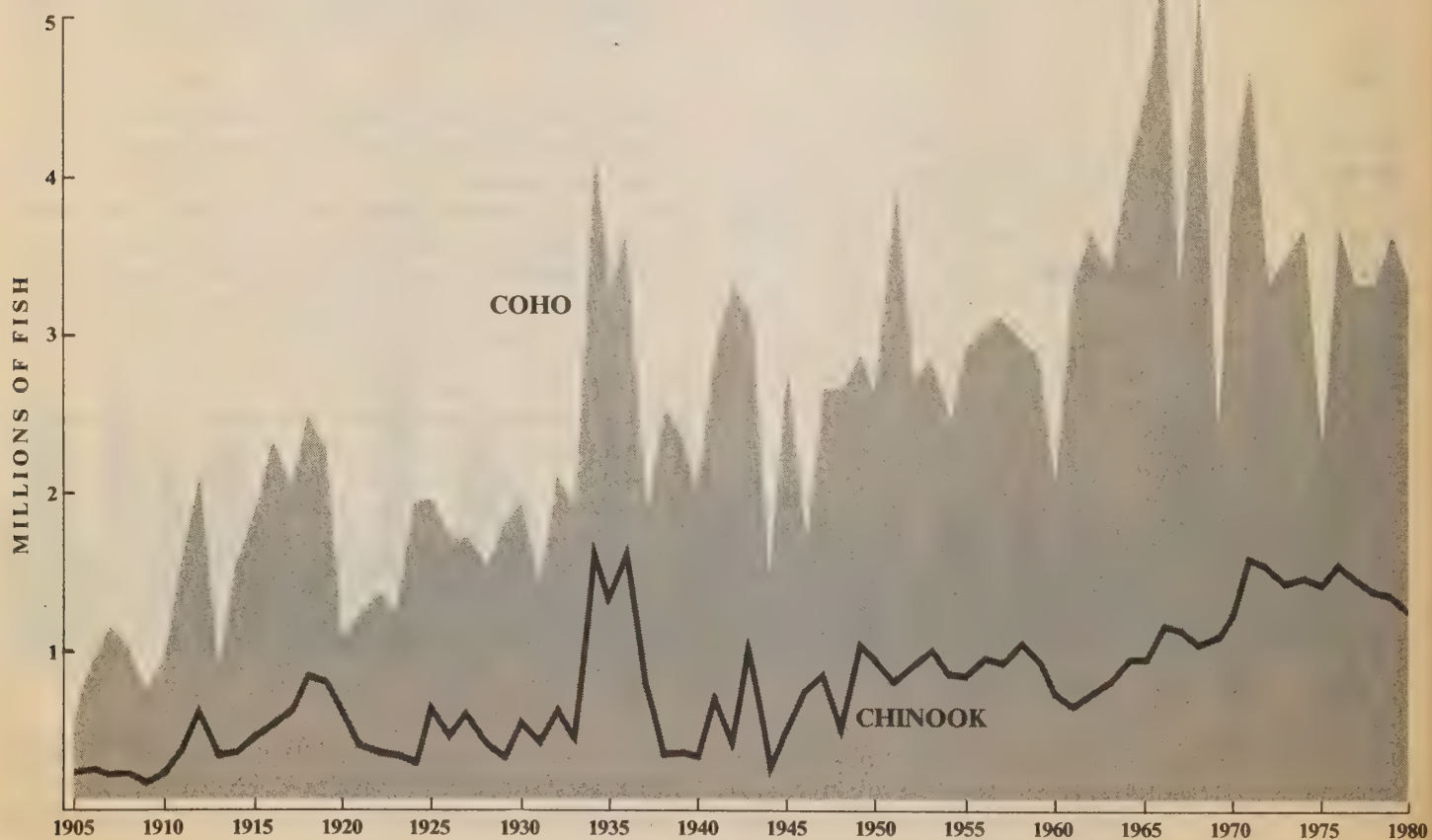


Figure 2-1b Commercial landings of chum and pink salmon since 1905.^a

^aData on Chum landings before 1910 not available.

Source: See footnote 4.

Figure 2-1c Commercial landings of coho and chinook salmon since 1905.

The Commission's researchers have analyzed the available data on catch and escapement to throw light on the stock size of each species, though suitable data for this purpose are available only for the last two or three decades. The results of these investigations, together with the longer term information on catches, allow some tentative conclusions about trends in the stocks, which I summarize below for each species.

Sockeye Landings of sockeye historically were substantially higher than they have been in recent decades. Fraser River stocks, which make up a significant proportion of the coastal total, were devastated by the disasters at Hells Gate in 1913 and 1914, and continued heavy fishing pressure has permitted only modest recovery since. In recent decades the stocks seem to have stabilized or increased.

In two of the seven large production areas for which the catch and escapements of sockeye have been analyzed by the Commission's researchers, namely the central coast and Rivers-Smith Inlets, stocks have been declining; in the Johnstone Strait area, they appear to be stable; and in all other areas they show an increase. Strict controls on fishing since 1979 and strong returns in 1981 may reverse the decline in Rivers Inlet stocks.

Chum Landings of chum salmon show a pronounced decline, beginning in the early 1950's and persisting until the early 1970's. It has only recently been recognized that natural chum salmon are much less productive than other species, so they can sustain a catch of only a small fraction of the total stock. The persistent decline is believed to be the result of excessive harvesting throughout most of this century.

The analyses of the Commission's researchers indicate that the chum stocks of the Fraser River have been increasing significantly. In all other areas the stocks now appear to be stable or increasing slightly except for the regions of northwest Vancouver Island and the southern Queen Charlotte Islands, where they show continued decline.

Pink The catch of pink salmon has varied widely from year to year, due in part to the two-year cycle of this species and in part to fluctuations in population sizes. However, no long-term increase or decline is apparent. And the remarkable reinvasion of pinks into the Upper Fraser River system since 1945, when fishways were built at Hells Gate, has offset the extinction of many small local stocks.

Analysis of the catch and escapement data suggest that the stocks of pink salmon have been stable or moderately increasing in most areas; notable exceptions are the declining trends in the Georgia Strait odd-year stocks and the Queen Charlotte Islands even-year stocks. Fraser River stocks show a strong rising trend.

Chinook The commercial catch of chinook salmon has risen significantly over the period of record. This cannot be attributed to healthy Canadian stocks, however, because a large proportion of the Canadian catch of chinooks has tra-

ditionally originated in rivers and hatcheries of the United States. Fish from the Columbia River, and especially those resulting from the enhancement projects on that river, have accounted for a significant portion of the Canadian catch in recent years. Our best estimates suggest that "American fish" account for 40 to 50 percent of the catch in the north and central coast areas, 20 to 45 percent in Georgia Strait, and 70 to 90 percent off the west coast of Vancouver Island.

Chinook stocks have clearly declined in recent years in the Georgia Strait, central coast, Skeena and Nass areas. In three other production areas examined — southwest Vancouver Island, Johnstone Strait and Rivers-Smith Inlets — the data indicate increasing stock abundance. Stocks in the Fraser River appear to be increasing, also, in spite of a sharp decline in escapements during recent years.

Coho In a pattern similar to chinook, the commercial landings of coho have risen steadily over the period of record, again due in part to U.S. hatchery production. To date there has been little to indicate that natural stocks will be unable to support current levels of exploitation, but the trend of increasing landings cannot be expected to continue.

Analysis of catch and escapement data indicate that coho stocks have been stable or increasing in many areas, including the northern Queen Charlotte Islands, western Vancouver Island, the Fraser and Nass Rivers and Georgia Strait. Other areas show stock declines, and the downward trend is particularly pronounced in the Skeena and southern Queen Charlotte Islands areas.

Interpreting the data on chinook and coho stocks is particularly difficult. In spite of the catch and escapement data, which indicate the stocks are increasing, natural production of these species from B.C. rivers could well have declined since 1960. But the decline has been masked by more intensive counting of escapements and larger catches of fish from enhancement projects in the United States and Canada. Indeed, some experts suspect that the apparent stabilization of some of these stocks follows directly from the hatchery production programs in the United States.

Steelhead Steelhead (rainbow trout which live part of their lives in the ocean but return to freshwater to spawn) have been subject to very heavy rates of exploitation. They are taken in the Indian fishery, they are the favorite species of river sportsmen, and the summer and early fall runs are harvested heavily since they pass through the commercial fisheries at the same time as salmon.

Information about the condition of steelhead stocks has improved substantially in recent years as a result of a special inventory program. The findings are sobering: of the more than 400 streams that support steelhead, only four or five large systems are very productive; stocks are much lower than previously believed and numbers are declining.

In response to these trends, the angler catch has been curtailed by catch-and-release regulations. On Vancouver Island, where these were first introduced, the results are very

encouraging. Such controls, coupled with measures to reduce the steelhead catch in other fisheries, appear to offer promising prospects for restoring depressed steelhead stocks.

Pressures on the Stocks

A wide variety of factors in addition to the catch of the commercial fleet affect the survival and productivity of our salmon stocks: unrecovered and unrecorded salmon mortality occurs in all sectors of the commercial fishery; additional catches are taken in the sport and Indian fisheries, and by foreign commercial fleets; habitat degradation, and depletion of food supplies and predation all affect survival and productivity. While we cannot determine precisely how much of the historic decline in salmon stocks is attributable to each of these various causes, it is widely accepted that the two most serious factors have been overfishing and environmental damage. The Commission's researchers have analyzed the available data on salmon populations in an attempt to assess the relative impact of these two pressures.

Their preliminary findings suggest that, in recent years at least, the main cause of the decline and continuing low abundance of certain stocks has been overfishing. Surprisingly, these analyses show that production rates per spawner have remained high, so that habitat degradation has not caused a measurable decline in any of the major producing areas or species. This is admittedly a broad generalization and will be subjected to further detailed study, but the findings are very consistent over the range of stocks that we have been able to examine. It does not mean, though, that habitat protection is not a serious problem. Chapter 10, which is devoted to habitat management, draws attention to the devastating and lasting impact that slides, dams and

diversions of watercourses have had on stocks in the past, and the widespread threat of logging, mining and pollution. Moreover, our findings are limited to the major stocks for which the best data are available, such as those of the Fraser and Skeena Rivers; we have not been able to analyze the runs in the hundreds of smaller streams that account for most coho production and altogether about half the production of all salmon. These smaller stocks are undoubtedly the most vulnerable to habitat damage. Further, even where overfishing is now the main pressure on the stocks, if habitats are degraded, any rebuilding of the stocks will quickly press on the reduced carrying capacity of the environment. Nevertheless, if these preliminary findings are sustained, they imply that, in order to rebuild many stocks, escape-ments must be increased.

Throughout the last hundred years, the fishing effort directed toward salmon has increased more or less continuously. Yet, as Figure 2-1 suggests, this growth in fishing effort has not resulted in increased harvest. This manifests a fundamental problem of the commercial fisheries which is discussed in Chapter 4. Here, it is sufficient to note that the pressure of harvesting is a major constraint on the abundance of salmon, and in many cases their rehabilitation will depend on reducing this pressure.

The recent catch levels of the five salmon species in the commercial, sport and Indian fisheries are summarized in Table 2-2.⁴ Each of these fisheries is examined in later chapters, where it will become clear that the catch statistics for the sport and Indian fisheries are very uncertain. Nonetheless, apart from a few important stocks in a few areas, it is obvious that the commercial fleet accounts for the overwhelming bulk of the harvest.

Table 2-2 The catch of salmon by sector

	commercial fishery						sport fishery		indian fishery		all fisheries
	seine		gillnet		troll		pieces ^b	%	pieces ^a	%	pieces ^a
	pieces ^a	%	pieces ^a	%	pieces ^a	%					
chinook	65	3	136	7	1,122	59	550	29	32	2	1,905
chum	1,328	48	1,341	49	21	1	0		52	2	2,742
coho	492	11	447	10	2,550	59	800	18	55	1	4,344
pink	6,380	68	1,421	15	1,408	15	77	1	37	1	9,323
sockeye	2,003	35	3,045	53	363	6	0		337	6	5,788
total	10,268	43	6,390	27	5,464	23	1,427	6	553	2	24,102

^a Thousands of fish, 1971 to 1980 ten-year average.

^b Thousands of fish, estimate for recent years.

Sources: See Footnote #4.

Potential Yields

Judging from the historical evidence that salmon stocks on the Pacific coast of Canada were capable of yielding catches of 300 to 360 million pounds per year, potential yields could well be more than double the harvests of recent years. The suggestion that salmon production could be returned to historic levels through enhancement and stock restoration apparently originated with the eminent fisheries

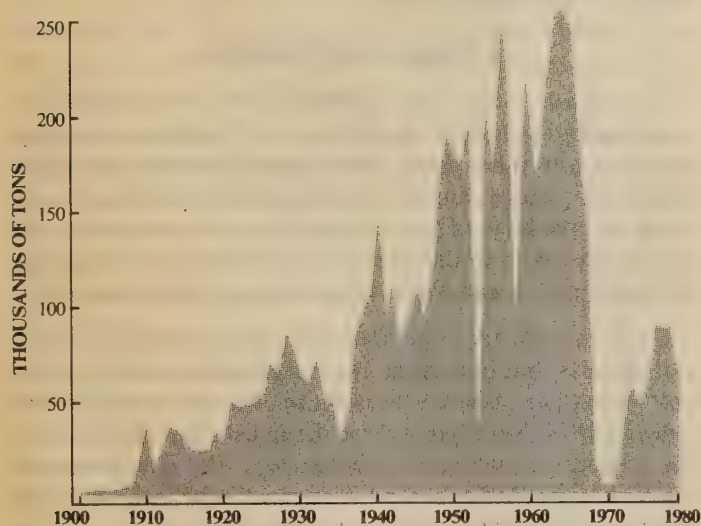
biologist Dr. W.E. Ricker.⁵ His estimate relied on a few special opportunities, notably rehabilitating Fraser River sockeye stocks to pre-1913 levels (which would double total sockeye production), restoring chum stocks coastwide and improving pink production on the south and central coasts. The analyses conducted by the Commission's experts support Ricker's conclusions. These opportunities are examined in more detail in Chapters 11 and 12.

HERRING

Herring have been exploited off the coast of British Columbia since 1877, but harvests were small until early in this century when a market for dry salted herring opened in the Orient. Annual catches rose to as high as 85 thousand short tons during the first World War, then declined to 3,000 tons in the Great Depression. Except as a by-product of food, reduction of herring into meal and oil was not permitted until the pilchard reduction fishery collapsed in the 1930's. Then a new herring reduction industry was established, and consequently catches increased sharply; in the 1950's herring landings reached as much as 178 thousand short tons per year. Catches in the early 1960's were even larger, reaching the record of 264 thousand tons in the 1962-63 season. After 1965 the stocks collapsed dramatically, and the reduction fishery was closed indefinitely in 1968.

A minor fishery for local food and bait herring continued after the 1968 closure, but in the early 1970's, as the stocks began to recover and a market for herring roe opened up in Japan, heavy industrial exploitation of herring resumed. The roe-herring fishery has since been a major but unstable industry, with landings in excess of 80 thousand short tons in 1976 and 1977. Catches have been much lower since then, and in 1980 landings amounted to only 19 thousand short tons. Lesser fisheries for food and bait herring continue, with landings of food fish in the order of 10 thousand tons in recent years, and of bait in the order of one to two thousand. The changes in herring catches since 1900 are indicated in Figure 2-2.

Figure 2-2 Landings of herring since 1900.



Source: Adapted from A. S. Hourston and C. W. Haegele, *Herring on Canada's Pacific Coast*, Canadian Special Publication of Fisheries and Aquatic Sciences (48), Department of Fisheries and Oceans, Ottawa, 1980, figure 19, p. 23.

Trends in Stocks

Data on herring have been gathered since the 1930's, and it has been possible to observe the response of the stocks to

a wide range of exploitation rates. As a result, the west coast herring fishery is exceptionally well documented for purposes of biological assessment. Nevertheless, the behaviour of these fish is not well understood. Large populations seem to spawn consistently in the same general areas, but segments occasionally split off to generate ephemeral concentrations in other areas, and some small populations appear to remain ecologically distinct.

Analysis of the historical evidence indicates that the peak catches of the late 1950's followed recruitment of several unusually strong year-classes; then in the 1960's exceptionally weak recruitment coincided with very heavy fishing pressure until the stocks collapsed. Stronger year-classes began to appear by 1971 and within four years most stocks recovered to the level of the 1950's. Subsequently there was apparently weak recruitment, especially in northern areas, followed by strong year-classes again in 1977-78.

The rise and subsequent sharp decline in production follows a classical pattern observed in many heavily exploited fisheries. But the recent rapid recovery in these stocks is remarkable.

The analysis undertaken by the Commission's advisors supports the hypothesis that large stocks produce low rates of recruitment, and this may explain the weak recruitments of the mid-1970's. Others have suggested that this was due to the roe-herring fishery, the argument being that this type of fishing drives fish away from their normal spawning areas into inferior habitats and induces premature spawning when milt is released by males who have been crushed in seine nets before they reach their spawning grounds. However, there is not yet enough experience to determine whether the roe fishery has had an effect on herring stocks except in northern areas where fishing pressure has probably been sufficient to retard or reverse stock recoveries. The recent weak recruitment on the west coast of Vancouver Island appears to be the result of normal fluctuations. Experience suggests that refraining from heavy fishing on these weaker year-classes is essential if the kind of collapse that occurred in the reduction fishery is to be avoided.

Potential Yields

The Commission's research team estimates that by 1975 the herring stocks in Georgia Strait had recovered to nearly the optimum level for long-term yields, and the spawning stocks on the west coast of Vancouver Island and the Queen Charlotte Islands may even exceed this level. On the north coast, however, stocks are well below the optimum size, and there are some indications that ecological changes may have reduced productivity in that region in recent years.

Biologists now believe that the optimum rate of exploitation of herring is in the range of 30 to 50 percent of the stock per year, and advisors to this Commission suggest that the stocks should be managed and exploited conservatively, with harvests not exceeding 30 percent. On this basis, the average annual catch of herring could be as high as 160 thousand metric tons for the whole coast, though with

significant year-to-year variations. However, in order to achieve this potential, resource data and regulation of the fishery will have to improve substantially, as discussed in Chapter 12.

Interdependence of Herring and Salmon

A matter of some controversy at the public hearings has been the relationship between salmon and herring. The usual concern is that because salmon feed on herring, herring fishing should be constrained. This belief accounts for the reluctance of authorities to permit full harvesting of the herring stocks, particularly in Georgia Strait. I therefore asked the research team whether they could throw light on this question.

The researchers have found no clear evidence that herring play a unique role in supporting other commercially valuable species, although they warn that there are few data available to support firm conclusions. Predatory species such as salmon and dogfish may prefer to feed on herring, but apparently other small fishes, euphausiids (tiny shrimp-like organisms) and squid provide equally adequate food.

There is no indication that the collapse of herring stocks in the 1960's affected salmon adversely in terms of either numbers or size.⁶ The body size of both chinook and coho salmon in many areas has been declining for at least two decades, and the trend has not reversed with the recovery of herring stocks. Moreover, the abundance of dogfish apparently increased steadily during the period of lowest herring abundance, after the dogfish liver fishery was terminated in 1949.⁷

However, there is some evidence that juvenile salmon compete with herring for plankton. This suggests that concern regarding the food supply of salmon should be directed toward plankton, and especially toward the consequences for salmon growth of any commercial exploitation of plankton and of any substantial increase in the numbers of small salmon from Canadian or U.S. enhancement facilities.

HALIBUT

The halibut fishery is among the oldest on the Pacific coast, and until it was recently overtaken by the roe-herring fishery it was second in importance to salmon. The fishery began in the last century off the coast of Washington State, and significant Canadian participation began during the first World War. Since then, the volume of halibut landings has fluctuated widely.

Native Indians and early commercial fishermen enjoyed a rich harvest from extensive stocks that contained a high proportion of large, mature fish. The landings of Canadian and U.S. fishermen peaked in the 1920's at some 70 million pounds, then declined to about 30 million in the early 1930's. Recognizing the need for joint action to preserve and develop the fishery, Canada and the United States created an International Commission for this purpose in 1923. The Commission's conservation program was successful in rehabilitating the stocks so that landings rose to 75 million

pounds in 1962. Since then, the stocks have again declined, and the landings of the two countries combined have ranged between 20 and 30 million pounds.

Over the years, the International Pacific Halibut Commission has accumulated a great deal of scientific information on this species and unusually complete statistical data on this fishery. It is now evident that the extensive migrations and wide distribution of halibut stocks leave them vulnerable to incidental mortality in fisheries directed to other demersal fish. Thus, by the 1960's, it had become clear that U.S. and Canadian trawl fleets, fishing for lower-valued bottom fish such as pollock, hake, sole and rockfish, caused high mortality in immature halibut caught incidentally and returned to the sea.

Even more serious was the trawling of distant-water fleets from the Soviet Union and Japan during the 1960's. Again, trawling was directed mainly to other bottom fish, but heavy "by-catches" of halibut were almost certainly the main cause of the sharp decline in halibut stocks. Other contributing factors were incidental catches in the Alaskan king crab fishery and, possibly, changes in the oceanic environment.

Halibut is a long-lived species and takes many years to mature, and so it may well take more than a decade to rebuild the stocks to the 1960 level. Thus the Canadian catch may have to be held below six million pounds for some time, and improved control of "by-catches" of halibut in other fisheries will be necessary as well. These depressed stock conditions, and recent re-alignment of the Canadian and U.S. fisheries following the extension of fisheries jurisdictions, have led to critical problems for the Canadian fleet, which I examine in Chapter 5.

OTHER GROUND FISH

Groundfish, other than halibut, have never figured as importantly in the fisheries of Canada's Pacific coast as they have in many other areas. Nevertheless, catches have been increasing steadily, and at 60 to 70 million pounds are now triple the landings of two decades ago. A wide variety of species are taken in this fishery, but catches are dominated by Pacific cod, ocean perch, hake and sablefish (black cod).

Catch records and other data have been collected for several decades, but interest in groundfish stocks remained low until Canadian fisheries jurisdiction was extended to 200 miles in 1977. Stocks that were previously ignored are now the subject of biological studies, and the Commission's research team has taken advantage of new techniques to analyze the stocks and potential yields of 14 species.

Although the available data are in many cases weak, these analyses indicate that most groundfish stocks are in good condition and have populations close to the levels capable of yielding the maximum sustainable catches. There are exceptions to this generalization for some species in certain areas, such as the depressed stocks of ling cod in Georgia Strait. But the only species that appears to be seriously overexploited over wide areas is Pacific ocean perch.

In short, these tentative stock assessments reveal few species for which yields are likely to decline and several which offer opportunities for increased catches — notably pollock, hake and dogfish. But the data are not yet adequate to estimate sustainable yields with much precision, and the potential of all groundfish species may be anywhere from the present landings of 75 million pounds per year to three times this amount. Markets for these groundfish have been weak and, unlike the fisheries discussed previously, market conditions rather than the productivity of the stocks will likely be the main constraint on expansion during the next few years.

INVERTEBRATE SPECIES

Small fisheries are based on a considerable variety of minor species. The list includes shellfish (abalone, clams, oysters, scallops, mussels, geoducks) crustacea (shrimp, prawns, crabs), cephalopods (squid, octopus) and marine plants. Some of these are exploited not only commercially but also in the Indian and sport fisheries, and in many cases the pattern of exploitation has been erratic in response to both market and population fluctuations.

In recent years the annual commercial harvest from all these fisheries combined has averaged about 20 million pounds. Most of this is accounted for by oysters (at 5.7 million pounds), geoducks (4.1 million pounds), shrimp (3.2 million pounds), clams (3.0 million pounds), crab (2.7 million pounds), and abalone and prawns (both at roughly 0.5 million pounds). Information on the stocks, their trends, and the potential yields for most of these species is poor, and the Commission's advisors believe that the available data cannot support the detailed analysis that has been applied to the other stocks. Accordingly, my comments are restricted to the most important of these minor species and are based on scanty information.

Oysters The Province of British Columbia, through the Marine Resources Branch of the Ministry of Environment, is responsible for regulating the oyster fishery. Commercial harvests have averaged nearly 5.7 million pounds in recent years. Most of the harvest is taken from cultured stocks, with wild stocks contributing probably less than 15 percent of the total.

The scope for expanded production of cultured oysters is thought to be substantial, though critically dependent on markets and production costs, so the Marine Resources Branch has been encouraging oyster culture rather than commercial production from wild stocks.⁸ This policy, coupled with increasing recreational harvesting of the more accessible wild stocks, makes it likely that commercial harvests of wild stocks will decline.

Geoducks The first commercial geoduck harvest which totalled 96 thousand pounds, was recorded as recently as 1976. With lucrative new markets in Japan, landings have since increased substantially to over six million pounds in 1980. Information on geoduck stocks is sparse, and the Department has fixed a limit to the annual harvest of six

million pounds, four million to be taken from the south coast and two million from the north. The appropriateness of these harvest limits is uncertain, and there is some evidence to suggest that geoduck stocks are being overexploited.

Shrimp and Prawns There are nine species of shrimp and prawns off the Pacific coast, six of which are exploited commercially. Shrimp catches have been fairly steady in recent years except for a large but short-lived fishery off Vancouver Island during the 1970's. Prawn fishing has expanded sharply during the last three years, the consequences of which are not yet apparent. Recent annual harvests of about 3.2 million pounds of shrimp and 0.5 million pounds of prawns are believed to be close to the maximum sustainable yields. The prawn grounds in certain areas, such as Howe Sound, are believed to have been overfished, and there appears to be little scope for increased yields of these species.

Clams Commercial harvests of roughly three million pounds of clams annually draw heavily on stocks of butter clams (1.4 million pounds), manila clams (0.7 million pounds) and littleneck clams (0.5 million pounds). Commercial landings have been recorded since the beginning of the century, but production in recent decades has been erratic as a result of market fluctuations and the recurrence of paralytic shellfish poison ("red tide"). It appears that only manila clams are now being harvested at or above the estimated sustainable yields. The sustainable yield for littleneck clams is believed to be between .75 and 1.25 million pounds, and for butter clams, between 4.5 and 7.5 million pounds. While the stocks thus appear capable of substantially increased levels of exploitation, the threat of paralytic shellfish poison is a serious impediment to expansion.

Crabs Abundant stocks of crab in coastal waters support both recreational and commercial fisheries. The total catch has fluctuated considerably as have crab populations which show volatile recruitment and mortality. Regulations permit retention of crabs larger than 6.5 inches (across the back of the shell) only; as long as the regulations are adhered to, this is a very effective means of protecting brood stocks because females do not grow that large and males reach breeding age before attaining that size. Harvests are now in the order of 2.7 million pounds annually, and the potential yields from crab stocks are likely to be between two and three million pounds, fluctuating from year to year in response to variations in stock size.

Abalone Abalone provide a traditional food for coastal Indians, and have a long history of commercial and recreational use as well. Like geoducks, abalone have recently been in strong demand in Japanese markets. After 1976, landings burgeoned, with a peak harvest of 954 thousand pounds in 1978. The total allowable harvest has since been progressively reduced, to 200 thousand pounds in 1981.

Little is known about the recruitment and growth rates of abalone, or about the current abundance of stocks. There

are some indications that the stocks have differing characteristics in different parts of the coast. Experience in the United States suggests that abalone are highly vulnerable to overfishing and that stocks recover very slowly once they have been overfished.

The potential yield of abalone is probably between 150 and 200 thousand pounds, less than one quarter of the peak landings in 1979. In Chapter 5, I discuss the problem of rationalizing the abalone fishery in the face of this sharply reduced catch.

CONCLUDING OBSERVATIONS

The preceding comments on the condition of our fish stocks are *tentative* conclusions based on the Commission's investigations so far. Nevertheless, these preliminary findings are somewhat reassuring insofar as most of our fish resources appear to be in better condition than many commentators have suggested.

Herring stocks, for the most part, appear to be healthy. And, with the exception of halibut and a few other stocks, groundfish are in good condition as well. With improved biological information, we should be able to manage these

fisheries so that exploitation will not endanger the viability of the stocks. Halibut stocks are seriously depressed, but the causes have been recognized and steps have been taken to control them. Moreover, the record of the International Pacific Halibut Commission suggests that the management of halibut stocks is in capable hands. I am also satisfied that, with a few exceptions, stocks of the many minor but often very valuable invertebrate species are in good condition. But demands on them are increasing, and this will require more management attention.

Our investigation of the condition of our salmon resource leaves me much less sanguine. The analyses conducted by the Commission's researchers indicate that some stocks of some salmon species are increasing, others are declining and others appear more-or-less steady. But an alarming dearth of information about salmon, by far our most valuable resource, hampers investigations of stock conditions. In many cases, the data on catch and escapement are inadequate for any meaningful assessment of population trends, and this is often so of major stocks; in other cases, only very rough estimates are possible. These deficiencies of data and scientific information are addressed in more detail in Chapter 12.

FOOTNOTES

1. Exhibit # 141a, p. 23.
2. For the years preceding 1920, data were obtained from Sixty-First Annual Report of the Fisheries Branch, Department of Marine and Fisheries. Ottawa, 1928. p. 86-87. (Production is reported in packed cases; the following pieces per case are used for conversion: sockeye, chum and coho — thirteen pieces per case; chinook — seven pieces per case; pink — twenty pieces per case); for the period 1920 to 1976, from Historical Catch Statistics for Salmon of the North Pacific Ocean, International North Pacific Fisheries Commission, Bulletin No. 39. Vancouver, 1979. Table 63; for 1977 to 1980 from Annual Summary of British Columbia Catch Statistics 1980, Department of Fisheries and Oceans. Vancouver, 1981.
3. W.E. Ricker, Changes in the average size and average age of Pacific salmon, Canadian Journal of Fisheries and Aquatic Science. Ottawa, (in press).
4. The data for the commercial catch are based on Blake Campbell, "Summary of salmon landings in British Columbia by species and gear," a memorandum prepared for this Commission. Vancouver, 1981; the sport catches of chinook and coho are the mid-points of the range estimated in "Recreational Fisheries," a background paper prepared for this Commission by the Department of Fisheries and Oceans. Vancouver, 1981; the sport catch of pinks is estimated in P.F. Loftus and W.D. Masse, Impact of S.E.P. and S.E.P. Cost Recovery on British Columbia Sport Fisheries, Department of Fisheries and Oceans. Vancouver, 1979. Table 1:5, p.16; the catch of the Indian food fishery is based on "Native Fisheries," a background paper prepared for this Commission by the Department of Fisheries and Oceans. Vancouver, 1981.
5. W.E. Ricker, Productive Capacity of Canadian Fisheries, Fisheries Research Board of Canada, Nanaimo Biological Station, Circular No. 64. Nanaimo, 1962.
6. W.E. Ricker, Changes in the average size and average age of Pacific salmon.
7. C.C. Wood, K.S. Ketchen and R.J. Beamish, Population dynamics of spiny dogfish (*squalus acanthas*) in British Columbia waters, Journal of the Fisheries Research Board of Canada, (36). Ottawa, 1979. p. 647-656.
8. H.J. Dorcey, Oysters, clams, marine plants - the development of small and beautiful industries in H.J. Dorcey, ed., Coastal Resources in the Future of B.C., Westwater Research Centre, University of British Columbia. Vancouver, 1979.

CHAPTER 3

The Fishing Industry

"We now have a declining resource base, over-capitalization in the catching and processing segments of the industry, reduced world market prices for seafood products, and increasing pressure on the resource from the numerous user groups."

PACIFIC GILLNETTERS ASSOCIATION¹

The fish resources of the Pacific coast are used in three more-or-less distinct fisheries: the commercial fishery, the sport fishery and the Indian fishery. The Indian and sport fisheries are examined in Chapters 8 and 9. This chapter sketches the structure and dimensions of the commercial fishery and provides the background to problems dealt with in subsequent chapters.

As noted in the preceding chapter, the commercial fishery takes by far the largest share of the catch. The commercial catch, like that of the Indian and sport fisheries, is dominated by salmon, but the industry uses a considerable variety of other species as well; and to a greater or lesser extent each constitutes a separate fishery, calling for special regulatory policies. The industry is commonly divided into two main sectors: the primary (or fishing) sector and the secondary (or processing) sector. This chapter describes these in turn and identifies the relationships between them.

THE FISHING FLEETS

Subsequent chapters describe the licensing systems employed in regulating commercial fisheries. These provide an identifiable fleet for each major fishery, but many vessels participate in more than one, and so the fleets are interdependent. Dominating the whole fishing industry is the licensed salmon fleet, which itself consists of several sectors.

The Salmon Fleet

The size and structure of the salmon fleet, and its economic circumstances, have changed significantly in recent years. In terms of technical sophistication, it is now among the world's most advanced small-boat fleets. Table 3-1 summarizes the number of vessels and the value of salmon landed in each sector of the fleet in the prosperous year of 1979.

Table 3-1 Structure of the salmon fleet and value of landings by gear type in 1979

gear type	number of vessels reporting landings	landed value of salmon ^a (millions of dollars)
gillnet	1180	\$ 21.6
troll	1689	68.2
seine	251	24.6
combination ^b	1639	72.9
total	4759	\$187.3

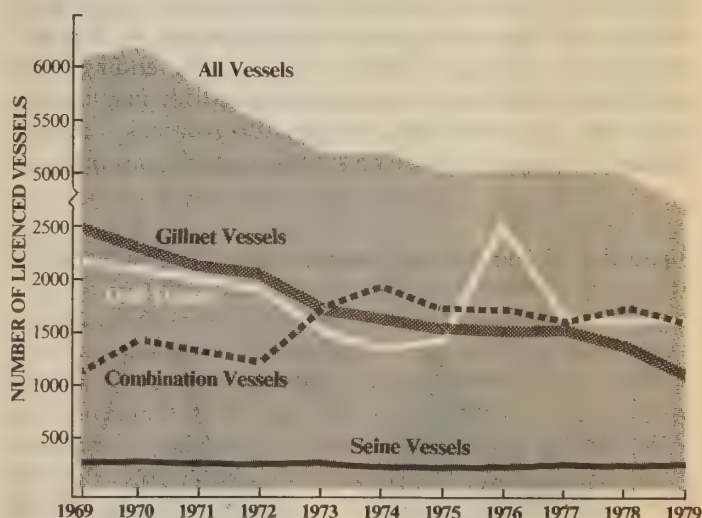
^a Includes estimated bonuses.

^b Includes all vessels that fished with more than one type of gear for salmon and all salmon vessels that engage in other fisheries as well.

Source: See footnote #3.

Recent trends Of particular interest in this investigation are the changes that have taken place since restrictive licensing was introduced to control unwarranted expansion of the salmon fleet in 1969. The number of vessels in the salmon fleet has declined fairly steadily, as shown in Figure 3-1; by 1979 there were only 4759 vessels reporting landings of salmon, compared to 6104 in 1969.²

Figure 3-1 Composition of the salmon fleet.



Sources: For years to 1975, G. Alex Fraser, Licence Limitation in the British Columbia Salmon Fishery; for later years unpublished data from the Department of Fisheries and Oceans.

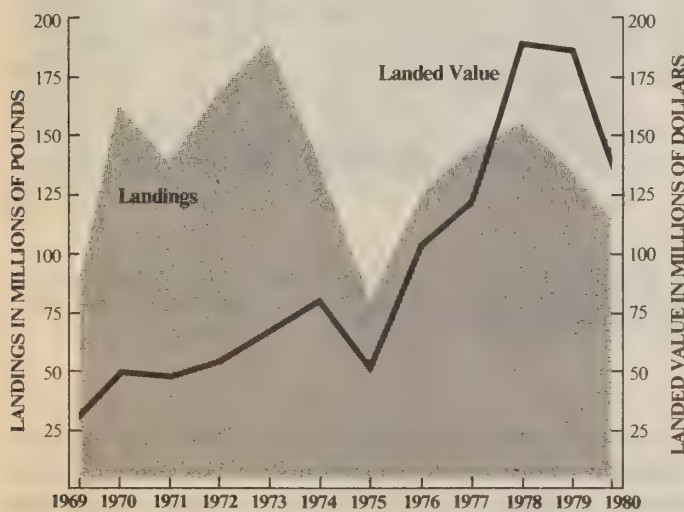
However, the composition of the fleet has changed markedly; some of the major shifts in the gear types are shown in Figure 3-1. The number of seine vessels has increased significantly, but this is not revealed in Figure 3-1 because many fish for roe-herring as well as salmon and are therefore included in the "combination" category. There were 251 seine vessels that fished only for salmon in 1979, a number that has not changed greatly in recent years. But the

268 seine combination boats were mostly added during the preceding decade. The increase in the number of salmon seiners resulted from vessels transferring from the halibut fleet, from gillnet and troll vessels converting into seiners, and from new vessels being added from the Indian "tonnage bank" as described in Chapter 7.

The decline in the numbers of gillnetters and trollers resulted mainly from conversions to seine vessels (which involved "pyramiding" the licensed capacity into fewer, larger vessels) and from withdrawals through the buy-back program between 1971 and 1974. But the indicated declines are somewhat misleading because increasing numbers of vessels carry both types of gear and hence are included in the "combination" vessel category. This has resulted from increased restrictions on net fishing, which have induced many gillnet vesselowners to add troll gear over the years in order to expand their fishing opportunities.

Production and earnings Salmon production fluctuates widely from year to year, reflecting the cycles of abundance of each of the salmon species described in the preceding chapter. Figure 3-2 illustrates the changing volume and value of landings since 1969. Salmon prices have risen considerably over this period, and so the value of landings shows a much stronger upward trend than the landed weight. In the peak year of 1978, 156 million pounds of salmon were landed, with a landed value of nearly \$190 million including post-season bonus payments.³ In the subsequent two years, and again this year, both landings and prices have been lower. As a result of the wide fluctuations in prices and volume of landings, the economic circumstances of the salmon fishery are conspicuously unstable.

Figure 3-2 Landings and landed value of salmon^a since 1969.



^a including bonus payments.

Sources: Fisheries Statistics of British Columbia, Department of Fisheries and Oceans, Vancouver, various years. Bonus payments to 1977 from P. H. Pearce and J. E. Wilen, Impact of Canada's salmon fleet control program, *Journal of the Fisheries Research Board of Canada*, 36(7), Ottawa, 1979, p. 766; for later years bonus payments estimated by Commission staff.

Earnings vary considerably among the sectors of the fleet because the average capacity of vessels in each gear category varies, because the several species of salmon differ in value and in their susceptibility to particular types of gear, and because the same species caught by different gear types can differ in value. Table 3-2 shows the average gross earnings of vessels in 1979 in each of the gear sectors. Because these are average earnings, they disguise a very wide variation of earnings among vessels in each sector. The year 1979 was one of high earnings with the total value of salmon landed being \$187 million. In 1980 it fell to \$136 million, and the value of roe-herring, also important to many salmon vessels, fell as well.

Table 3-2 Average value of landings by salmon vessels in 1979

	vessels fishing salmon only	vessels fishing salmon and other species		all landings
		salmon	other species	
gillnet	\$18,300	\$ 23,200	\$ 5,400	\$ 23,300
troll	40,400	45,400	20,500	43,800
seine	97,800	130,800	220,400	226,200
all vessels	\$36,700	\$ 44,000	\$ 42,400	\$ 53,800

Source: Based on unpublished data from the Department of Fisheries and Oceans.

In order to indicate the total earnings of vessels in the salmon fleet, Table 3-2 shows not only the value of salmon landed but also the value of other species landed by salmon vessels. The importance of other species (particularly roe-herring) has increased in recent years and is especially marked for the seine sector, which landed nearly as much in terms of value of other species as it did of salmon in 1979.

Vessel values Subsequent chapters draw attention to the expansion of unproductive investment in fishing capacity, which has become a major problem in commercial fisheries policy. Despite the attempt to limit growth in fishing capacity through the restrictive licensing program, investment and capitalization have continued, although they have added nothing to production.

Table 3-3 shows the estimated average value of vessels in each sector of the fleet prior to the 1979 season. These estimates are based on vesselowners' estimates of the market value of their vessels, reported on their commercial fishing vessel license application forms. The total reported value of all vessels in 1979 was \$86 million in gillnetters, \$141 million in trollers, and \$135 million in seine vessels, for a total fleet value of \$362 million. It should be noted that these estimates ambiguously refer to cost or replacement value or market value; and while vesselowners are requested not to include the value of their salmon licenses in their estimates of vessel values, the majority are believed to do so. These 1979 figures are well below the estimates, by informed observers, of the value of the salmon fleet in 1981.

Table 3-3 Average value of vessels in the salmon fleet in 1979

	single gear	combination ^a vessels	all vessels
gillnet	\$ 33,300	\$ 49,000	\$ 38,600
troll	60,100	104,000	67,800
seine	189,100	358,500	260,000

^a Includes all vessels that fished with more than one type of gear for salmon and all salmon vessels that engaged in other fisheries as well.

Source: Based on pre-season estimates declared by vesselowners on their vessel license application forms, from the Department of Fisheries and Oceans.

The reported values of vessels have risen several-fold in the last decade, but the extent is confused by unreliable estimates, inflation and changing license values. One study estimated that the real (deflated) capital value per seine vessel increased between 1969 and 1977 by 43 to 55 percent, per gillnet vessel by 24 to 40 percent, and per troll vessel by 69 to 78 percent.⁴ Over this period, combination seine vessels accounted for three quarters of the total increase in capital in the salmon fleet.

Ownership The ownership of the salmon fleet is widely dispersed. Processing companies own some boats; fishing companies own several vessels each; while individuals own an overwhelming number.

The ownership of vessels by processing companies has been of particular concern in presentations to this Commission because of anxieties among fishermen about corporate control of the fishing sector. Since the beginning of the salmon fishery on this coast, processing companies have maintained their own fleets to secure supplies of fish. Company vessels are rented or chartered to fishermen, many of whom are Indians (as described in Chapter 7).

When restrictive licensing was introduced in the salmon fishery in 1969, processing companies which comprised the membership of the British Columbia Fisheries Association owned 13.2 percent of all salmon vessels. The companies were advised by the Minister that they would not be permitted to exceed this proportion and, as the total number of licensed vessels was reduced, they would have to reduce their fleets in proportion. Through sales of vessels and the "pyramiding" of smaller vessels into larger seine vessels in the years that followed, the number and proportion of vessels owned by processors declined, and is now slightly more than 11 percent of the number of licensed salmon vessels.

Table 3-4 summarizes the latest information on the ownership of vessels by processing companies. In 1979 they owned 133 seiners, a quarter of all salmon vessels in that category. Much larger numbers of gillnet, troll and gillnet-troll vessels were in company fleets, but they comprised a much smaller proportion of the total number of vessels in these categories. In particular, companies owned few of the large number of single-gear troll vessels. Table 3-4 also shows that the vessels owned by processing companies

caught fewer salmon, on average, than other vessels of the same type.

Table 3-4 Salmon vessels owned by processing companies in 1979

	number	proportion of fleet total (percent)	proportion of all landings by gear type (percent)
seine and seine combination	133	25	24
other vessels	403	10	5
all vessels	536	11	10

Source: Based on unpublished data from the Department of Fisheries and Oceans.

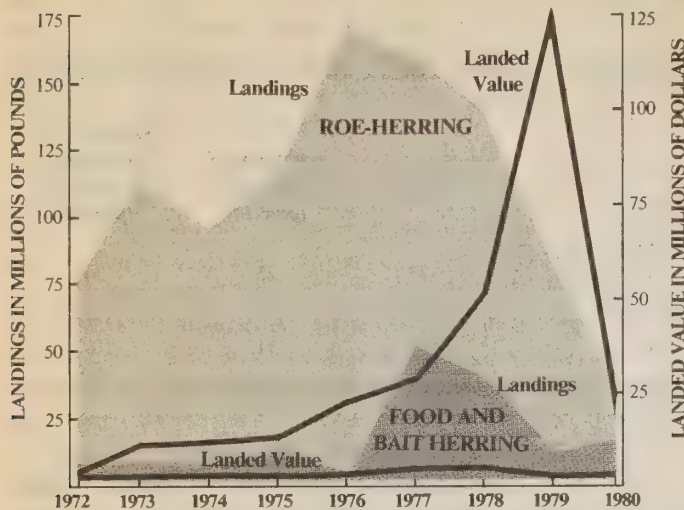
Note that these numbers refer only to vessels wholly owned by processing companies; they do not include vessels in which processors have partial equity or other financial interest, such as a mortgage or loan guarantee. From the point of view of public policy, the important issue is the extent to which such arrangements are used to "tie" vesselowners and thereby reduce the competition for fish. Significantly, in recent years vesselowners appear to have become less dependent on processing companies for financial support, and the companies have preferred to withdraw from financial commitments to fishermen, so that the control of the fleet by processors has almost certainly declined.⁵ Later in this chapter, I note that the largest processing company intends to divest itself of a substantial portion of its fleet; if these boats are acquired by fishermen, and not other processors, the share of the salmon fleet owned by processors will fall to well below 10 percent.

The Herring Fleet

Until 15 years ago, a distinct herring fishery with a distinct seine fleet supported a reduction industry. Since then, a new industry based on herring has evolved. The main product is herring roe produced in a brief spring fishery. But a more-or-less separate fishery in the fall produces herring for food, and small quantities are produced for bait and other purposes. Nowadays, all of the food herring and much of the roe-herring is taken by seine vessels, which are typically licensed to fish salmon as well.

Figure 3-3 illustrates the history of wide fluctuations in herring harvests and shows the recent trends in landed value. As indicated in that figure, earnings in the roe-herring fishery have been extremely volatile. In the record year of 1979 gillnet vessels averaged gross earnings of \$50 thousand and seine vessels about \$268 thousand, but as in the salmon fishery there is a wide spread around these averages. The "herring bonanza" of the 1970's was associated with strong markets for roe in Japan. In 1980, a weak market compounded by a fishermen's strike caused landed values to decline by 80 percent. Landings were considerably higher this year, though prices have remained well below the peak levels of 1979.

Figure 3-3 Landings and landed value of herring since 1972.



Source: Fisheries Statistics of British Columbia, Department of Fisheries and Oceans. Vancouver, various years.

Chapter 6 traces the rapid expansion of the roe-herring fleet in the 1970's, and the severe overexpansion of fishing capacity in spite of a restrictive licensing scheme intended to control the fleet size. By 1980, there were 248 seine vessels and 1310 gillnetters licensed for this fishery, of which 61 seiners and 399 gillnetters operated under special licenses for Indians.

All but 10 or so of the seine vessels fish salmon also, and some operate in other fisheries as well. The special punts that have been developed for the herring gillnet fishery are less versatile, and most of these are used for no other purpose. These gillnet vessels have increased in number most sharply, so that by 1980 they accounted for half the catch.

As in the salmon fleet, there has been substantial new investment in fishing capacity for roe-herring in recent years. The average value of a herring punt tripled to \$12 thousand in only three years following 1976. Seiners also increased in size and capitalization, though we cannot separate the influence of the herring and salmon fisheries in this trend. However, size and hold capacity are most important in the roe-herring fishery, and this has had the effect of increasing the size of vessels in the salmon seine fleet as well.

The food and bait herring fishery takes a much smaller catch than the roe-herring fishery, but it has been somewhat more stable. Most food herring is sold in Japan as a dried product of relatively low value, so the value of landings in this fishery is even smaller relative to the roe-herring catch. Bait herring is sold to domestic commercial and sport fishermen.

The price of food and bait herring has risen steadily in recent years from \$119 per ton in 1975 to more than \$300 in 1980, though markets are expected to be very weak this year. The catch quota has been reduced by half in recent years, however, so the total value of landings has fallen from \$4.2 million in 1978 to \$2.7 million in 1980.

The number of vessels permitted to operate in the food and bait herring fishery has not been restricted and, as explained in Chapter 5, the capacity of the fleet now far exceeds that required to harvest the quota. In 1980, some 250 permits were issued, though a considerable number of these were not exercised.

The pattern of ownership of the herring fleet is similar to that of the salmon fleet. Processing companies owned 14 percent of the seine vessels and 6.5 percent of the gillnetters licensed to fish in the roe-herring fishery in 1979. In total the company owned vessels represented 7.5 percent of the fleet engaged in the roe-herring fishery, and accounted for 7.4 percent of the catch.

Herring Spawn-on-Kelp Operations

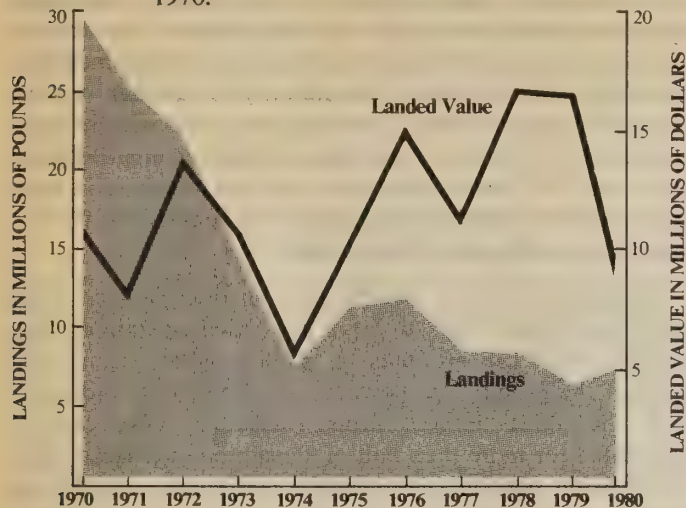
Closely allied to the roe-herring fishery is the production of spawn-on-kelp, which — like the other herring products — mainly serves Japanese markets. In this fishery the fish are not harvested; instead, they are impounded while they spawn on kelp which is then dried and sold as a food delicacy.

This fishery has been regulated under restrictive licenses since 1975. In allocating licenses, preference has been given to native Indians and, of the 28 licenses issued in 1980, 13 were held by individual Indians and five by band councils.

This small fishery has been very lucrative. In 1979 the harvest was valued at \$4.6 million, and average earnings were \$172.8 thousand and \$121 thousand for individual licensees and band councils, respectively. However, earnings in 1980 fell to about half the level of the preceding year.

The Halibut Fleet

The recent history of the halibut fleet and the severe economic circumstances that this long-established fishery now faces are described in Chapter 5. As shown in Figure 3-4, landings have declined sharply during the last decade. This has resulted from pressures on the stocks and reduced access to stocks off Alaska for Canadian fishermen. In 1980 the catch was 7.3 million pounds, down from nearly 30 million pounds in 1970. Until 1980 the value of landings had been buoyed up by rising prices but in that year the value of the catch fell by more than half, to \$9.1 million, and it is expected to decline further this year.

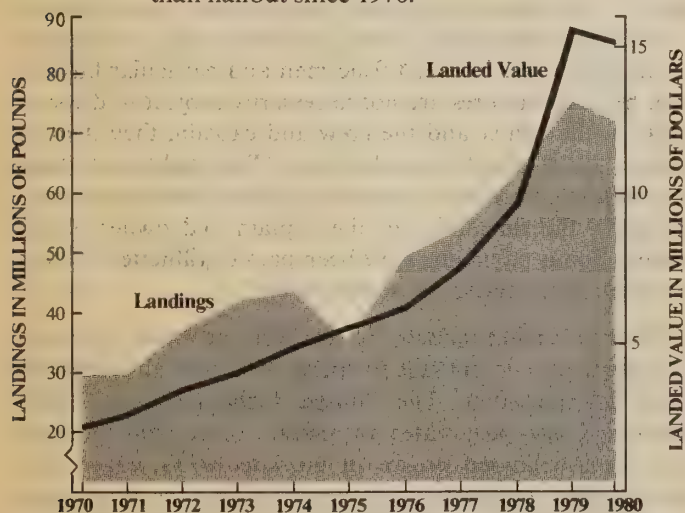
Figure 3-4 Landings and landed value of halibut since 1970.

Source: Fisheries Statistics of British Columbia, Department of Fisheries and Oceans, Vancouver, various years.

The licensed halibut fleet now consists of 450 longline and troll vessels, of which 10 operate under special Indian licenses. Their average earnings in 1980 were slightly more than \$20 thousand. Some of these vessels operate in the salmon and other fisheries, but the specialized longline vessels that depend entirely on halibut now face an economic crisis, which is examined further in Chapter 5.

The Groundfish Fleet

Landings of groundfish other than halibut have risen steadily over the last decade. A variety of species are taken in this fishery, but more than half the value of landings consists of varieties of cod. Rockfish and sole account for much of the rest. The 1980 catch of 72.7 million pounds was more than double the landings in 1970, as shown in Figure 3-5. The value of these landings has increased even more sharply over the same period, from \$2.2 million to \$15 million.

Figure 3-5 Landings and landed value of groundfish other than halibut since 1970.

Source: Fisheries Statistics of British Columbia, Department of Fisheries and Oceans, Vancouver, various years.

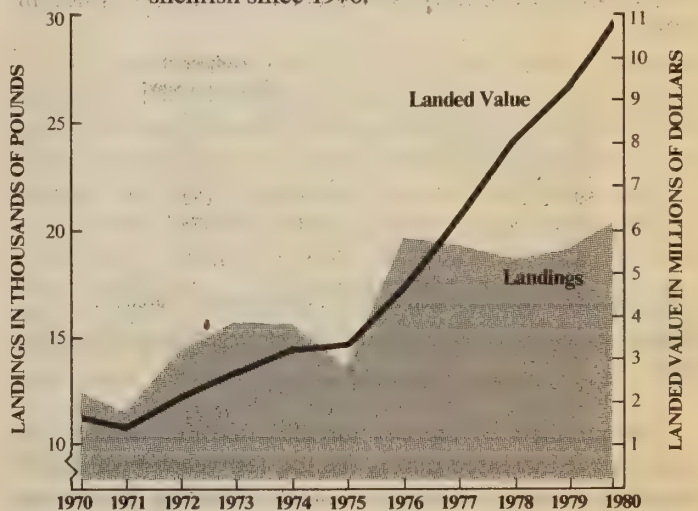
In addition to these reported landings, a number of trawlers sell their catch directly to foreign vessels (factory ships) operating under permit within Canada's 200-mile economic zone. Some 28 million pounds of groundfish, mainly hake with minor quantities of pollock, valued at nearly \$2 million, were sold to Soviet and Polish ships by 15 Canadian trawlers in 1980; this was about three times the amount sold in the preceding year.

The gear employed varies. In 1979, 115 trawl vessels, 45 longline boats and 426 troll and handline vessels reported significant landings of groundfish, and others caught groundfish incidentally. However, the trawl fleet took more than 95 percent of all groundfish landings, even though of the 115 trawlers only 34 fished groundfish exclusively. The others operated in a variety of other fisheries, mainly salmon and herring.

The earnings of vessels in the groundfish fishery are difficult to determine because most vessels operate in other fisheries as well. The 115 trawlers averaged \$99 thousand in groundfish in 1979, but \$199 thousand in landings of all species (including roe-herring, which yielded record returns in that year). The 34 trawlers that reported only groundfish landings had average gross incomes of \$131 thousand. The incomes of some trawlers are supplemented by chartering as packers for processing companies during the salmon and herring seasons.

Invertebrate Fisheries

A considerable variety of other species are taken in minor, specialized fisheries. These are invertebrates (mainly crabs, shrimps and prawns) and shellfish (dominated by clams, oysters, geoducks and abalone). Production in these small fisheries has grown substantially in recent years, and the value of landings has increased even more rapidly, as Figure 3-6 shows. Landings have nearly doubled over the past decade to 20.4 million pounds in 1980, and the landed value of \$11 million in that year was nearly seven times the corresponding figure a decade earlier.

Figure 3-6 Landings and landed value of invertebrates and shellfish since 1970.

Source: Fisheries Statistics of British Columbia, Department of Fisheries and Oceans, Vancouver, various years.

The most important species in terms of quantity landed is now geoduck, which has increased from almost nothing four years ago to more than six million pounds in 1980. Crabs, clams and oysters accounted for a little less than four million pounds each in that year. The remainder consisted mostly of shrimp and prawns (1.4 million pounds) and abalone (0.2 million pounds).

Some of these fisheries, notably clams and oysters, do not employ vessels, and for the rest it is hardly meaningful to identify a fleet because the vessels are often only incidentally used in harvesting these minor species. However, 40 percent of the crab landings were taken by 93 vessels that caught that species only; and 61 vessels caught only shrimp, accounting for 25 percent of the landings of that species.

Some of these fisheries are regulated by restrictive licensing. Licenses have been issued to 244 vessels to trawl for shrimp and additional permits are issued for the north coast where stocks are under-utilized. The new geoduck fishery is now limited to 45 licenses and the abalone fishery to 26. The special problems of the latter fishery are examined in Chapter 5.

THE PROCESSING INDUSTRY

The interface between the primary fishing industry and the processing sector is the market for raw fish. The characteristics of the sellers' side of this market are described above. The remainder of this chapter deals with the fish processing industry.

Fish buyers and processors are regulated by licenses issued by the Province of British Columbia, and their numbers are summarized in Table 3-5. A license is issued for each cannery, fish camp, packer or other facility, so the number of licenses is considerably larger than the number of companies involved because some have several facilities. Note also that a processor license authorizes fish purchasing as well as processing, so the number of buyers is greater than the number of buyer's licenses issued.

Table 3-5 Fish buyers' and processors' licenses issued in 1980^a

	number of licenses issued
salmon cannery	18
fish cold storage	92
fish processor	179
fish buyer	672
other	175
total	1,136

^a Figures refer to licenses issued in the fiscal year ending March 31.

Source: Marine Resources Branch, British Columbia Ministry of Environment.

The numbers of licenses for all categories except canneries have increased during the last few years. Fish buyers have increased particularly rapidly, reflecting in part an influx during the late 1970's of so-called "cash buyers," often associated with foreign interests. The cash buyers pur-

chase and pay for fish on the fishing grounds, unlike established processors who normally record deliveries and settle fishermen's accounts at the end of the season. They are not usually associated with processors having canning facilities, and they therefore often compete only for the best quality fish for freezing. However, most fish are purchased by long-established processing companies or their agents. Between 1973 and 1977 these processors, who are involved in canning as well as fresh and frozen sales, accounted for 95 percent of the purchases of raw salmon.⁶

Processors include a variety of enterprises ranging from small specialized firms to large integrated operations that produce most fish products. A small number account for most of the production, however. A recent study indicated that the three largest firms (excluding cooperatives) accounted for more than half of all salmon purchased.⁷ But a significant portion of the catch never enters a market as such; in the salmon and herring fisheries the landings recorded by vessels owned by processing companies, by members of fishermen's cooperatives, and by others who have made advance commitments to buyers, are not subject to arms-length transactions.

Determination of Fish Prices

The prices paid in the two major fisheries, salmon and roe-herring, are heavily influenced by pre-season negotiations between representatives of fishermen and processors. Fishermen are represented mainly by the United Fishermen and Allied Workers Union and the Native Brotherhood of British Columbia, and processors, by the Fisheries Association of British Columbia. Minimum prices are negotiated for salmon caught with net gear, though in recent years the prices paid have often risen above these minima as a result of strong market demand and the influence of cash buyers. The prices paid for salmon landed with troll gear are not negotiated, and they are generally higher than prices for net-caught fish, depending on species and quality.

The landed prices paid for salmon understate the full payment for the catch because of post-season bonus payments paid to vesselowners. In recent years bonuses have become a significant component of the payments for fish. They serve to strengthen ties between fishermen and particular buyers; and, because bonuses are not necessarily subject to division between the owner and the crew and captain, they tend to bolster the return to vesselowners. (The traditional share system for seine vessels provides 7/11ths of the earnings to the crew, the remainder to the captain and owner of the vessel.) Bonus payments have been paid to gillnetters as well as seiners, and recently to some trollers.

The roe-herring industry is relatively new and has been turbulent, so it is difficult to speak of a normal process of price determination. The United Fishermen and Allied Workers Union negotiates an amount to be paid to crews (not the full landed price). In the late 1970's, eager cash buyers drove roe-herring prices well above the levels contemplated when the pre-season price agreements were concluded.

In other fisheries, prices are determined more flexibly in response to market supply and demand. Most halibut are sold through long-established "exchanges" in Prince Rupert and Vancouver, in which buyers post bids and sellers negotiate sales, often before the fish are landed. The prices of other species also fluctuate with market conditions between and during the fishing seasons.

In addition to landed prices and bonuses, some processors provide fishermen with services at less than cost. These have been most important in the salmon fishery, and take a wide variety of forms, such as packing and collecting facilities, boat and gear storage, repair facilities, credit and capital financing, and commitments to purchase all fish delivered. This practice appears to have been declining in recent years as fishermen have become more independent and prices have become increasingly important in determining the distribution of fish.

Structure of the Processing Industry

Fish processors produce a wide variety of products, which in 1979 had a wholesale value of \$666 million, as shown in Table 3-6. More than half of the total was accounted for by salmon products. Roe-herring accounted for almost one-third of the total, though the value of these products has declined considerably since then.

Table 3-6 Wholesale value of British Columbia fisheries products in 1979

	thousands of dollars
salmon	115,927
canned	115,927
fresh	8,127
frozen	143,093
roe	11,393
total	\$389,627
roe-herring	
roe	182,304
spawn-on-kelp	5,011
frozen for roe	5,163
total	\$192,478
food and bait herring	
frozen for food	3,204
bait	2,133
herring by-products	4,118
total	\$9,455
halibut	20,141
groundfish	34,166
oysters	5,532
other shellfish and invertebrates	14,232
total, all products	\$665,631

Source: Compiled from Fisheries Statistics of Canada, Annual Summary 1979, Department of Fisheries and Oceans, Vancouver, 1980.

In 1980 there were 77 processors of salmon; of these, 13 produced canned products, 42 produced frozen salmon, and 41 prepared salmon for fresh markets.⁸ In recent years the number of enterprises serving the fresh market has increased considerably, and the volume of salmon processed into fresh or frozen products has increased while the share canned has declined somewhat. The number of roe-herring processors has seen a dramatic rise and fall, from 21 in 1975 to 42 in 1979, down to 17 in 1980.

Recent fluctuations in numbers of salmon and roe-herring processors and buyers have been triggered mainly by changing market circumstances in Japan. The majority of those that entered and exited were small firms, and they had little effect on the general pattern of control in the processing industry.

The degree of corporate concentration in the processing industry is indicated in Table 3-7, which shows the shares of production accounted for by the largest producers. The industry is most concentrated in the canned salmon sector, where the four largest firms account for 82 percent of the total output. Concentration is much lower in fresh salmon processing, and has been decreasing as this sector has grown in recent years. The four largest firms processed only 30 percent of output in 1980, down from 57 percent five years earlier. Concentration in herring roe production is almost as high as in canned salmon, although the figures shown for 1980 exaggerate this because a strike that year interrupted supplies to many firms.

Table 3-7 Share of production of salmon and herring products accounted for by the largest firms in 1980

	salmon			herring roe	
				all products	
	fresh	frozen	canned		
(percent of all production)					
two largest firms	23	54	68	49	70
four largest firms	39	63	82	62	84

Source: Unpublished data from the Department of Fisheries and Oceans.

Last year the dominance of the largest processor, British Columbia Packers Limited, was increased through its acquisition of assets from the Canadian Fishing Company Ltd. These included vessels, vessel servicing facilities and processing capacity. This transaction increased British Columbia Packers Limited's share of salmon processing capacity from about one-third to about 42 percent in 1980.⁹ In addition, the last few years have witnessed a number of bankruptcies and takeovers among smaller firms. These bankruptcies and mergers, and not internal growth of the largest companies, account for the increased concentration of the processing industry.

Vertical Integration

An issue that has attracted a good deal of attention is the extent to which processing companies have extended their interests into fishing. The reverse phenomenon is exem-

plified by fishermen's cooperatives, through which fishermen have combined to extend their interests into processing.

An indication of the extent of integration by processors into the primary fishing sector is given by the share of landings accounted for by vessels which the processing companies own. As noted earlier, the processing companies owned 11 percent of the vessels in the salmon fleet and these accounted for 10 percent of the salmon landings in 1979. In the roe-herring fishery the processing companies owned 7.5 percent of the vessels and these accounted for 7.4 percent of landings in 1979. Several comments are in order. First, because these figures refer only to vessels wholly owned by processing companies and do not include vessels in which they have a financial interest, they will understate the share of landings which may be considered "tied" to the processors. Second, despite this understatement, concentration in the fishing sector is clearly much lower than in the processing industry. Third, a review of the data over time indicates that the share of the salmon catch taken by processor-owned vessels has increased slightly in recent years, but their share of the herring catch has not. Finally, these figures exclude fishermen's cooperatives, even though these organizations link the two sectors of the industry, because the fishing vessels are owned by individual fishermen.

These data, and the evidence presented earlier in this chapter, suggest that processing companies have not been increasing their control over the fishing sector by any marked degree in recent years. The number of vessels they own and the share of the total fleet they represent have declined, though their share of the salmon catch may have risen slightly. There are indications that their interests in other vessels have declined also. Other evidence suggests that the average value of processor-owned vessels has lagged relative to other vessels in recent years.

The largest vesselowner, British Columbia Packers Limited, has declared its intention to divest itself of the fleet it recently acquired from the Canadian Fishing Company Ltd., and if these vessels are sold to buyers other than processing companies the degree of industrial integration will be reduced further. In general the processing industry appears to be depending more on market competition for fish and less on the traditional means of securing fish from their own or "tied" fleets.

PRODUCT MARKETS

Most of the fish products produced on the Pacific coast are sold in export markets where imports from this region constitute a small fraction of market supplies. This means that the market power of producers is low.

Canada produces only 13 percent by weight of the world's catch of Pacific salmon, and roughly 70 percent of this is exported. Some 44 percent of these exports are in the form of frozen salmon sold in Japan, but they account for only 11 percent of Japanese imports of this product and a consider-

ably smaller share of total Japanese consumption. The market share of Canadian producers in other export markets such as Britain and Europe is also low. Thus

Canada's (B.C.) position in supply and market is by no means dominant — it must react to resource and economic realities related to the harvests in other countries.

Resource management policies and industrial practices should not be constructed or maintained in isolation or ignorance of activities in these other countries.¹⁰

Sales in the domestic market are very sensitive to retail prices. Salmon and most of the other fish produced on the Pacific coast are luxury foods, which do not constitute a major component in the diet of most Canadians, so price increases will induce them to shift to meat, poultry and other substitutes. All this implies that producers can exercise little influence over the prices they obtain for their products. Moreover, they are highly vulnerable to external economic circumstances such as supplies from elsewhere, changing exchange rates, and world economic conditions.

Products other than salmon have narrower markets. Herring roe is sold almost exclusively in Japan, and disruptions in the Japanese market (associated with depletion of Japanese stocks and reduced supplies from China) have created highly unstable conditions in the Canadian roe-herring industry. In this market as well, Canadian suppliers have little influence on price.

Groundfish, other than halibut, are of much lower value and hence are not sold in distant markets. Some 60 to 70 percent of the groundfish produced on the Pacific coast is sold in Canada, the rest almost entirely exported to adjacent markets in the United States. The minor products serve a variety of specialized markets. Geoducks are sold almost entirely in Japan, as are most abalone; mussels are sold mainly in Europe, while other shellfish, shrimps, prawns and crabs are sold mostly in Canada.

CONCLUDING OBSERVATIONS

During the last few years, the Pacific fisheries have been subjected to repeated shocks, caused mainly by disruptions in foreign markets for fish products. In the late 1970's, the two major fisheries, salmon and roe-herring, experienced a surge in product demand. Prices soared, output rose, and processors adapted their production to meet the new market requirements. Fishermen invested heavily in new fishing power. New ventures entered the processing industry, mainly to freeze salmon and process herring roe, the two products that experienced the strongest demand and required the least capital investment.

In 1980 the bubble burst; markets collapsed, prices fell and catches declined. Many fishermen found themselves heavily in debt, small processors withdrew from the industry, and even well-established firms consolidated. Today,

the industry remains in difficulty. Catches this year have been fair and markets more stable, but prices are weak and high interest rates coupled with exchange rates that obstruct access to foreign markets continue to depress the immediate

outlook. It is in these rather bleak circumstances that this Commission has attempted to identify opportunities for an improved framework of governmental policy for the development of the Pacific fisheries.

FOOTNOTES

1. Exhibit #70, p. 3
2. Note that these figures refer to the number of vessels that reported landings. The number of vessels licensed is somewhat higher.
3. Vessel numbers and landings derived from unpublished data from the Department of Fisheries and Oceans. Bonus payments for the years 1969 to 1977 were taken from P.H. Pearse and J.E. Wilen, Impact of Canada's Pacific salmon fleet control program, Journal of the Fisheries Research Board of Canada, 36(7). p. 764-9; for the remaining three years, bonuses have been estimated by the Commission's staff.
4. Sol Sinclair, A Licensing and Fee System for the Coastal Fisheries of British Columbia. A report produced under contract for the Department of Fisheries and Oceans. Vancouver, 1978.
5. The Public Regulation of the Commercial Fisheries, a report prepared for the Economic Council of Canada by the Economics Study Group at the University of British Columbia, 1980 (publication pending). This study indicates that the number of vesselowners indebted to processors declined from 1472 in 1970 to 475 in 1977.
6. Marvin Shaffer and Associates, An Economic Study of the Structure of the British Columbia Salmon Industry. A report prepared for the Salmonid Enhancement Program. Vancouver, 1979.
7. Marvin Shaffer, An Economic Study of the Structure of the British Columbia Salmon Industry.
8. Unpublished data from the Department of Fisheries and Oceans.
9. British Columbia Packers Limited reports its current level of participation in the industry as follows (Exhibit #98, p. 18):

	share of total catch (percent)	share of processing capacity (percent)
salmon	10	42
herring	7	25
other	—	30
total	8	37
10. Exhibit #98, p. 16.

Part Two

Commercial Fisheries

CHAPTER 4

Licensing and Regulating Fleet Development

"... the present fisheries policy instruments have failed to encourage practices that would efficiently capture the potential natural wealth of the industry."

ECONOMIC COUNCIL OF CANADA¹

The central problem for the commercial fisheries is the fleets' chronic overcapacity. All of our major fisheries, especially the salmon, herring and halibut fisheries, have greatly expanded their fishing power in recent years. But because the quantity of fish has not increased, most of the new capital investment in vessels and gear and the advanced technology that has been added to the fleets is wasted. Our most valuable stocks could be fully harvested with only a fraction of the capital and labour now expended on fishing them. This wasteful pattern of development reflects governments' failure, in spite of repeated attempts, to develop a policy that would encourage the industry to develop efficiently.

While commercial fishing generates employment and revenues in direct and indirect taxes, like other industrial activities, the potentially substantial direct return from the resources themselves is so eroded by unnecessarily high costs of harvesting that it falls short of even the costs of fisheries management and administration. So, even though our stocks are exceedingly valuable and are capable of being harvested at low cost, the direct return to the people of Canada is negative.

The failure of the fishing industry to generate the economic returns to fishermen and other Canadians that it is capable of is unquestionably the most urgent issue in reforming commercial fisheries policy.

The excessive fishing power of our major fleets not only prevents us from realizing the potential returns from our resources, it creates other problems as well. It puts fishermen, burdened with increasing commitments in vessels and gear, under heavy financial strain. It aggravates conflict between competing sectors of the fleets, and between the commercial fleet and other resource users. It complicates, and often frustrates, stock conservation and management, and the proper regulation of fishing effort. Moreover, it sometimes prevents full utilization of available catches because fisheries managers fear that an opening will attract so much fishing power that the stocks will be decimated. So,

in the interests of both resource conservation and industrial performance, fisheries policy must reverse the tendency of fleets to expand their fishing capacities redundantly. Indeed, protection and enhancement of the natural resource can be of little benefit if the major user, the commercial fishery, remains so inefficiently organized.

Restricting commercial fishing privileges through licensing has been the main instrument for regulating the structure and size of the fishing fleets and hence, influencing their economic performance. Such a program was introduced by the federal government more than a decade ago in an attempt to prevent further redundant expansion in the salmon fleet. Not only did it restrict licensing of vessels, it also introduced a "buy-back" scheme whereby licensed vessels were purchased and retired. This program has clearly failed in its main objective since the fleet's capacity and capitalization has since expanded substantially. Other licensing restrictions introduced later to other fisheries on the Pacific and Atlantic coasts have had mixed success.

This chapter deals with licensing policy in the context of ensuring efficient development of the commercial fishing industry. My public hearings have revealed conflicting opinions about the cause of the problem, the reasons for the failure of past efforts to control the fleet, and the probable effectiveness of alternative measures. For these reasons, and because of the importance of this issue, I attempt to set out in this chapter the fundamental forces that produce this special problem of the fisheries, the basic requirements of corrective policies and the alternative approaches that might be adopted. The following two chapters contain recommendations regarding commercial licensing. Because these interim changes must be consistent with the long-term objectives of licensing policy, the underlying rationale and problems of licensing are dealt with in some detail.

THE TREADMILL OF OVERCAPACITY

The perplexing phenomenon of excessive expansion of productive capacity is a problem common to fisheries, and can be observed in major fisheries throughout the world. The design of effective corrective policies requires a clear understanding of the cause of the problem, which is now well documented in academic and official studies.²

The problem is rooted in the way the commercial fisheries have traditionally been organized. Until very recently, fisheries throughout most of the world were open to unrestricted numbers of fishermen and fishing enterprises. Harvesting was, and still is, based on the "rule of capture"; that is, the stocks are common property resources, each fisherman competes for a share of the catch, and none has a right to any particular quantity until he has landed it. In these circumstances, whenever the value of the harvest rises above the cost of fishing, profits accrue to the fishermen; these profits encourage fishermen to expand their vessels' fishing capacity and also attract new entrants into the fishery.

Consequently, in an unregulated fishery, high returns to fishermen will not persist for long. Even in potentially rich

fisheries, where a valuable catch could be taken at low cost (as in the salmon fishery), the opportunity for high returns are inevitably eroded through fleet expansion. And if the total harvest is not somehow restricted, rich stocks are threatened with depletion through excessive fishing effort. But even if the catch is restricted to a sustainable yield (as has been attempted in the salmon and other Pacific fisheries), fleet expansion ensures that profits will, on average and in the long run, be low. In short, open-access fisheries are always unprofitable in the long run.

Such fisheries are also unstable. Any increase in the available catch, or rise in the price of fish, or technological development that lowers the cost of fishing effort, induces fleet expansion; opposite changes force painful contraction through financial failures. This has been the history of major fisheries not only on the Pacific coast but also on the Atlantic coast and throughout the western world.

This response in the fisheries is not the result of irrational behaviour on the part of fishermen. When an industry is profitable, the producers will usually expand their productive capacity; and as long as there are no serious barriers to new entrants to the industry, their numbers will grow. But unlike most other industries, such expansion in fisheries is likely to take place even when no additional production is possible. The harvest is simply spread more thinly across the expanded fleet.

No individual fisherman can control the fishing effort of others, so each has a strong incentive to expand his fishing power to obtain a larger share of the catch or to protect his share from competitors. This leads to expansion in the catching power of the fleet as a whole and to distortions in fishing technology. Hence, questionable innovations are adopted to increase the speed of vessels, to increase hold capacity in order to reduce running time and to enable vessels to work further offshore in order to intercept fish earlier than others. The resulting excess capacity and distorted fleet structure is counter-productive and irrational, even though it results from rational responses of individual fishermen to economic incentives. These tendencies result from the resource base being treated as common property, and would not occur if users had exclusive rights to harvest the resource, or part of it, as is the case in most other resource industries.

Governments have responded to these adverse tendencies with regulations that are generally directed toward protecting stocks from overfishing. They have restricted type of gear, fishing time and fishing areas in order to control fishing effort, with the result that the fisheries are now among the most highly regulated industries. This is not the place to examine the effectiveness of these restrictions in protecting the stocks, but it should be noted that they do nothing to control expansion of the fleet and that they sometimes aggravate distortions in its structure.

Other policies have been directed toward alleviating the economic stress resulting from overcrowded fisheries. Subsidi-

dies have been designed to assist fishermen with investments in new or improved vessels, and others to improve fishermen's earnings. Obviously, this kind of financial support, whatever its other social effects, tends to lower the cost of, and thus enhance the returns from, fishing. Hence, it fuels the expansion of redundant fishing capacity.

EARLY ATTEMPTS TO CONTROL FLEET CAPACITY

The need to control the expansion of fishing fleets in Canada's Pacific fisheries has been recognized by astute observers for nearly a century.³ In the 1880's, anxieties about overexploitation of salmon on the Fraser River were sharpened by the apparent depletion of stocks in the Columbia and Sacramento Rivers to the south. A fisheries official on the Fraser opined in 1887 that "... it is about time that some limit ... be placed on the number of nets allowed on this river ...".⁴

Two years later, in 1889, the Dominion government limited the number of licenses for fishing boats on the Fraser to five hundred. Three hundred and fifty of these were distributed among the canneries according to their canning capacity. The only way they could obtain more licenses was to expand capacity, and as the fishery became more profitable, the canneries, predictably, expanded their capacity simply for that reason. New canneries were built as well, the number increasing from twelve to eighteen within three years. The vessel limitation scheme therefore broke down and was abandoned in 1892. By the following year the number of licenses had doubled to more than a thousand.

A second experiment was attempted on the north coast, where nearly all the fleet was owned by canneries. By 1907 the Commissioner of Fisheries for British Columbia had become alarmed at the increasing number of boats and, fearing a repetition of the Fraser River experience, proposed that "... no additional canneries should be permitted to be constructed in the North, and that a limit be placed upon the number of boats which the existing canneries should be permitted to operate."⁵ A limit was instituted the following year. Under the allotments, 850 boats were allowed to fish the Skeena; and 750, Rivers Inlet. Boats were allocated among the canneries through private negotiations among them. Inevitable disagreements arose, which threatened to cause the arrangements to collapse. So in 1910 the provincial government took control, determined to enforce a "... solution of a problem which has wrecked many of the salmon fisheries of the Pacific Coast and has constantly threatened all."⁶

But again, high profits in fishing led to the demise of the regulatory system. As the value of salmon escalated during the first World War, the government acceded to pressures to issue licenses to new canneries. Under pressure to provide job opportunities for returning soldiers at the War's end, the Dominion government lifted all restrictions on cannery licenses in 1917.

The established canneries objected strongly to the return of unlimited access; the government responded by appoint-

ing a Royal Commission (the Evans Commission) to investigate the problems of the salmon industry. The Commission's report reveals a remarkably perceptive understanding of the need for controls.

... it seems to us equally clear that all conditions surrounding the industry should as far as possible be stabilized and the excessive use of capital and labour obviated or prevented.... The solution of this problem would not seem to be found in encouraging or permitting the employment of more capital or more labour than can efficiently perform the work.... If the cost of production becomes too great all hope of advantage to the public as consumers will disappear.⁷

The Commission therefore recommended limiting the industry and collecting excess profits. These recommendations were not adopted, however.

The fisheries continued to expand, and several decades later, in 1958, Dr. Sol Sinclair was appointed to investigate the salmon and halibut fisheries. By this time the general theory of why common property fisheries inevitably overexpand was better understood. Sinclair proposed a system of restricted vessel licenses and levies on the catch to dampen incentives to overinvest.⁸ These recommendations were vigorously debated and provided the basis for the license limitation plan (the Davis Plan) introduced for the salmon fishery a decade later.

THE DAVIS PLAN

In 1968 the Minister of fisheries announced an innovative program to control the salmon fleet through a system of restrictive licensing of vessels. Its purpose was "... to increase the earning power of British Columbia salmon fishermen and to permit more effective management of the salmon resource by controlling the entry of fishing vessels into the fishery...".⁹ The Davis Plan, named after the Minister at the time, was designed to prevent further fleet expansion and subsequently to reduce its size and rationalize its structure.

The Plan involved four phases. The first phase required freezing the number of vessels by licensing only those that could show a significant dependence on the salmon fishery (though some others were licensed as well). The second involved reducing the fleet by purchasing and retiring excess vessels. The third was concerned with improving vessel standards and product quality. The final phase, which was never pursued, entailed improving the fleet's structure and relaxing some of the restrictions on fishing effort of the reduced fleet. The structure and evolution of the program is described in more detail in Chapter 6.

Today, after more than a decade of restrictive licensing, the number of vessels in the salmon fleet is smaller, the fleet's structure has changed significantly, and the vessels are much improved in technical sophistication and safety.

But the Plan has clearly failed in its main purpose, which was to control and reduce excessive fishing capacity. Investment in fishing power has continued and the capacity of the fleet has more than doubled.¹⁰

In retrospect, the program probably initiated the first difficult steps in bringing the fleet under control, but it seems to have been overtaken by events, and it was not developed sufficiently to achieve its basic goal. One group summarized it as follows:

The Davis plan was successful in providing one of the world's most efficient and modern small boat fleets. And therein lies the problem. The fleet has a tremendous increase in catching power at the cost of a near total dissipation of economic rents.¹¹

Despite its evident failures, the basic form of restrictive licensing adopted for the salmon fleet has subsequently been adopted for the other major fisheries on the Pacific coast in response to similar problems of over-capacity and excessive pressures on the stocks. The various systems now in place are described in Chapters 5 and 6.

LICENSING: RATIONALE AND POLICY OBJECTIVES

Licensing policy on the Pacific coast has evolved in response to urgent problems, the peculiarities of individual fisheries and accumulating experience. The result is that today it lacks coherence and consistency particularly in the provisions relating to such matters as the appurtenancy of licenses, the fee structure, transferability and criteria for renewability and replacement. Moreover, in the most important fisheries the system has obviously failed in its primary purpose of controlling fleet expansion.

To bring some order to this important part of commercial fisheries policy, a clear statement of the purposes and objectives in regulating fishing privileges is needed. The following paragraphs identify these basic purposes and objectives, which therefore provide a framework for evaluating the strengths and weaknesses of present licensing arrangements. The components of this framework follow from those aspects of the Commission's terms of reference that stress the need to protect the public interest in fish utilization; to ensure that the method of granting fishing privileges will promote proper resource management and conservation, equity, and efficient fleet development; and to ensure that charges for the right to fish commercially are consistent with the value of the resources utilized.

Resource management and conservation The licensing policy, like other aspects of fisheries policy, must be designed to facilitate proper resource management and to conserve the fish resources. These requirements entail the following. First, the total catch must be controlled to protect the stocks from depletion. Second, the composition of the catch must be controlled. This is because the sustainable yield from a stock of fish usually depends, not only on *how many* fish are caught, but also on *what* fish are caught, (in terms of age

and size) *when* they are caught, and *where*. This means that fishing gear, fishing time and fishing areas must all be regulated. So any licensing system must accommodate these requirements.

Economic efficiency The licensing policy must also be designed to promote efficient development of the fishing industry. In the past, in order to control the total catch, the harvesting ability of the fleet was reduced through restrictions on fishing time and gear. Such controls can certainly reduce effective fishing effort, but they are also highly inefficient. From an economic point of view, simply preventing the fleet's capacity from expanding beyond the level required to efficiently harvest the catch would be much better.

So a licensing system, in order to promote efficiency, must prevent the development of excessive fleet capacity and distorted fleet structure. (It is important to note that the problem of overexpansion is not simply one of too many boats, as is sometimes suggested. The fleet's capacity depends not only on the number of vessels but also on their individual fishing power.) But this will not in itself be sufficient to ensure economic efficiency since the economic problem does not arise from the expansion of capacity as such, but from the excessive cost of fishing due to too much labour and invested capital. So, while fishing power or capacity might be restricted by regulations, investment and the cost of fishing could continue to grow (as we have seen from long experience). Economic rationalization of the fleet, therefore, calls for measures to prevent the wasteful use of capital, labour and other inputs so that costs will not be excessive. This must be the primary objective of a licensing policy and the main criterion for evaluating its success.

In addition, the licensing policy must ensure that the fleet distributes itself efficiently among fishing grounds; and it must promote, or at least not impede, the development of an efficient and competitive processing industry.

Flexibility The fishing industry is susceptible to rapid changes in markets, in fishing technology, and in the availability of the resources themselves. Fisheries policy must recognize this instability, and licensing arrangements must be adaptable to unforeseeable changes in circumstances without depending on continual governmental intervention. This implies, for example, a system that will allow the fishing industry to respond to changes in technology or prices without setting off a wave of unproductive investment, and that will allow regulators to change the allowable catch in light of resource requirements without abrogating established rights.

Security Fishermen and vesselowners are vulnerable to shifts in the industrial environment that are beyond their control. Fluctuations in world prices for fish, new technological innovations in fishing, trends in costs of fuel and other requirements, and changes in resource availability are not only unpredictable and uncontrollable by private individuals but in large part by governments as well. While a

fisheries policy can do nothing about these uncertainties, by setting out clear long-term fisheries policy goals, it can do much to enable more purposeful private investment and planning. In addition, the licensing arrangements themselves should be designed to provide as much certainty as possible by using appropriate terms, by containing unambiguous provisions with respect to renewability and transferability and by clearly documenting policies and practices rather than by relying on vague administrative practices.

Public revenues There is narrow scope for public revenues from fisheries at present, mainly because the overexpanded fleet leaves only modest returns to the labour and capital employed in the industry. But the charges now levied for fishing privileges are mostly low, inconsistent, and devoid of any apparent equity. If they are to be made "... consistent with the value of the resources recovered, after fair and reasonable returns to commercial fishing enterprises ..." as my terms of reference dictate, the present structure of levies must be substantially altered and rationalized.

Social goals Among the most important objectives of fisheries policy is that of ensuring opportunities for fishermen to earn reasonable incomes. This underlies the need for proper resource management and industrial development. But beyond this, fisheries policy, probably more than any other industrial policy, has been formulated with perceived social and economic needs of particular groups, communities and regions in mind. This can be explained by the historically poor economic environment of the fisheries, the economic and cultural dependence of certain ethnic and social groups on fishing and the identification of fishing with particular regions and communities.

Many fishing groups on this coast feel that the fisheries authorities have been excessively preoccupied with regulating people at the expense of resource management and industrial development. I am not sure that this criticism is justified, but my review of the licensing arrangements has convinced me that the measures used to protect the interests of particular groups and communities have been inconsistent, sometimes contradictory and often unsuccessful. Certainly the measures taken in the past to maintain the participation of Indians in the commercial fishery, to protect the position of small operators and to prevent encroachment by one sector of the fleet on another have been only partly successful at best.

The present predicament of the Pacific fisheries, and of those involved in it, makes it essential that fisheries policy, especially the policy relating to the issuance of fishing privileges, recognize certain pressing social problems and contribute to their solution. The need for economic opportunities for Indians and for coastal communities dependent on fishing are the most urgent of these. In contrast to past policies, the special economic and social problems must be clearly identified; the methods to be used for alleviating them agreed upon; and the particular role that fisheries policy is to play, specified in a coherent and consistent form.

Only then can the fisheries authorities be expected to administer licensing and other arrangements that will serve these special purposes effectively. The Department of Fisheries and Oceans is not necessarily the appropriate agency to identify social problems or to design corrective programs, and it may be that it has too often attempted to do so. But where such problems exist, and modifications to fishing arrangements afford the best means of improvement, fisheries policy should be appropriately modified.

Simplicity The licensing system has become extremely complicated, and it has been imposed on an industry that was already intensively regulated. Some of the complexities are the result of the experimental nature of the licenses, which were introduced, one after another, to deal with different circumstances and problems. Other complexities arose as new regulations were designed to deal with unforeseen deficiencies in old regulations.

The different kinds of licensing systems vary widely in their requirements for information, administrative complexity, and in the means used to ensure compliance. They vary also in how burdensome compliance is for fishermen and vesselowners. As a general rule, methods that are simpler, need less data, offer fewer opportunities for conflict between licensees and regulatory authorities, are more readily enforceable and entail lower costs of administration, are to be preferred.

The development of the fishing industry is influenced by agencies other than the Department of Fisheries and Oceans. Federal and provincial authorities responsible for taxation, shipbuilding, transport and other matters all have a significant impact on the development of the industry, and, unless their activities are well coordinated, they can frustrate the objectives of licensing policy and aggravate the complexity of fisheries regulation. This obviously calls for sensitivity and close liaison among the levels of government, their Departments and Ministries.

The more a system depends on compelling licensees to behave contrary to their economic interests, the more complex the regulations need to be. Furthermore, a licensing technique that relies on compulsion for achieving the desired objectives is under much more strain than one that relies on private incentives. So, clearly, a licensing policy that is consistent with licensees' economic interests is preferable to one that is not.

A review of the history of licensing reveals the crucial significance of this. Attempts to control the growth of the fleet by restricting one or more dimensions of fishing power, when vesselowners have strong incentives to expand capacity, generate ingenious innovations to circumvent the restrictions and thereby defeat their purpose. Additional restrictions must be added to plug the loopholes. But this becomes an exceedingly difficult and costly administrative task. The likelihood that such restrictive measures will be any more successful in the future than they have been in the past is very low. Therefore, when evaluating alternative

approaches, I give greater preference to methods that will use private incentives in constructive ways. There are several ways of accomplishing this, as explained below, and they afford opportunities for simpler licensing as well as much less complicated and troublesome administration.

The foregoing list of considerations are the ones that should, in my opinion, be used in making decisions about reforms in commercial fishing privileges. There are, of course, other considerations peculiar to particular fisheries, but these are the guidelines for general policy, and they provide a framework for evaluating the existing arrangements and alternative approaches discussed below.

ALTERNATIVE APPROACHES TO FLEET RATIONALIZATION

As mentioned, the primary purpose of licensing must be to promote efficient development of the fishing fleet. If it fails in this objective and fleets expand out of control, the other objectives noted above will be difficult or impossible to meet: stocks will be increasingly threatened, the economic performance of the industry will deteriorate, and the earnings of fishermen and returns to the public will be low.

Licensing can be used in a variety of ways to promote efficient fleet development. The following paragraphs sketch the range of alternatives, all of which have been raised during the public hearings.

Restrictions on Gear and Fishing Time

Controls on gear, fishing time and location of fishing can, as noted already, serve an important purpose in increasing yields by affecting the composition or quality of the catch, but they cannot be an effective means of controlling fleet capacity. If they are used for this purpose (as they frequently have been), they are likely to worsen economic performance by imposing higher fishing costs, reducing the catching capability of vessels and accommodating a larger, less efficient fleet. Moreover, as capacity in fishing expands, fishing seasons must be shortened and the fleet and processing capacity must be correspondingly idled. This approach, therefore, does not meet the basic criterion of promoting an appropriate fleet size and structure, and so does not warrant further discussion.

Restrictions on Fishing Units

Restrictive licensing as a means of controlling fleet development has been adopted, not only in the major fisheries of Canada's Pacific and Atlantic coasts, but also in the United States, Australia and a number of other countries.¹² Under this system, licenses or permits convey the restricted right to fish to a person, a vessel, or some other dimension of a fishing unit. On the Pacific coast restrictive licenses have been applied to vessels, by restricting vessel numbers, tonnage and length, and to persons, by restricting the number of individuals permitted to engage vessels. Elsewhere licenses have been used to restrict engine horsepower and units of gear, among other things.

This approach has a fundamental weakness: when one or more inputs in the fishing process are restricted, the capacity of the fleet can continue to expand by adding other, unrestricted inputs. As a result, this technique has consistently failed to achieve the desired results. For example, in the Pacific salmon fishery, the initial restriction on the number of vessels led to their being replaced with larger vessels. Then, in an effort to control vessel size, restrictions on tonnage and length were added. These led to further investment in new gear and vessel improvements. In the roe-herring fishery, restriction of the number of persons permitted to fish has not prevented expansion of the fishing power of their vessels.

Experience in other fisheries and in other countries has been similar, though less dramatic.¹³ The basic problem is that the design and structure of a fishing unit is flexible, and restrictions on one or two dimensions cannot, in the long run, prevent increased investment in other dimensions.

And while, theoretically, restrictions could be placed on all dimensions of fishing effort simultaneously, such restrictions would have to be so numerous and diverse (covering vessel size, power, crew, time spent fishing, gear for finding, catching and holding fish, and so on) that they would be virtually impossible to administer and enforce. In addition, they would preclude any technological improvements in fishing.

Governments in Canada and elsewhere have undoubtedly been attracted by the administrative simplicity of rudimentary restrictive licensing. Moreover, such systems can provide a useful foundation on which more effective regulatory arrangements can be built (and later I recommend that some of those in place in Pacific fisheries be used for this purpose).

Royalties on the Catch

An alternative proposal for rationalizing fisheries, which has not yet been attempted in domestic fisheries, involves levying a tax or royalty on the catch. Undoubtedly such a charge would reduce the profitability of fishing and hence blunt incentives (and the financial ability) to expand fishing capacity.¹⁴

As the primary means of controlling fishing capacity, however, this method has serious disadvantages. To prevent expansion, the royalty would have to extract all the profits from fishing; it would have to be different for different areas and stocks; and it would have to be adjusted constantly to changing prices, costs and resource availability. The latter two would entail formidable and unpopular administrative tasks, while the former would leave no benefits to fishermen. Furthermore, any attempt to raise the charges high enough to eliminate excess capacity would cause painful dislocation. For these reasons, I do not propose that a royalty be used as the main instrument for controlling fleet development in the Pacific fisheries, but I suggest later that a royalty offers an appropriate adjunct to other regulatory measures.

Individual Fishermen's Quotas

During the last couple of years, increasing attention and experimentation has been directed toward regulating fisheries by providing individual fishermen or vesselowners with rights to harvest specific quantities of fish. Variants of this "stinting" approach have been adopted in some of the smaller fisheries on this coast and in several important fisheries on the Atlantic coast. This technique is similar to that used to regulate the use of other renewable natural resources owned by the Crown, such as timber, water, grazing rights, and so on: the government issues licenses that authorize use of specified amounts of the resource, and the total amount licensed is constrained to the total recoverable yield of the resource.

The outstanding advantage of this approach is that it eliminates the basic cause of overcapacity in the fishing industry by removing the incentives of individual fishermen to protect and increase their share of the catch. So, rather than encouraging fishermen to competitively and defensively increase their fishing power, it encourages them to adapt their vessels and fishing methods to take their licensed catch at the lowest cost.

This approach has other advantages as well:

1. It provides a direct means of controlling the total catch and ensuring that it will be within the sustained yield targets set for the stocks.
2. It frees the regulatory authorities from many of the problems associated with regulating fishing activity. Some controls on fishing would obviously still be required for the biological reasons noted earlier. But with the total catch controlled by licenses, most of the restrictions on vessels, gear and fishing time that are now used to prevent overfishing would become unnecessary.
3. It adds to the security of fishermen and eliminates much of the risk they otherwise face about their catch.
4. It can accommodate changes in economic conditions without disruptive effects: notably, if fish prices rise or for other reasons the fishery becomes more profitable, earnings will increase, but there will not be an automatic tendency to expand fishing capacity.
5. It lends itself to a variety of methods for raising revenues in the form of license fees and landings charges.
6. It is, in principle at least, administratively simple. And because it deals directly with the problem of regulating the catch, once licenses are issued the regulatory authorities can concentrate on resource management rather than on regulating the fleet's fishing activities.

This method does have some disadvantages: to ensure compliance with the quota, reliable information on landings would have to be acquired; if a fishery is based on several stocks that require individual management, separate quotas may have to be issued for each; adjusting quotas in fisheries that depend on stocks that fluctuate widely and unpredict-

ably would be difficult. These latter problems would obviously be more serious for the salmon and roe-herring fisheries than for the halibut or shellfish fisheries. In addition to these disadvantages, fishermen's unfamiliarity with the approach is an obstacle to its adoption.

Nevertheless, as a means for regulating the catch and promoting fleet rationalization, licensing individual fishermen's quotas appears to hold more promise than any of the other approaches described above. Wherever it has been introduced, although there have been various adjustment problems, it has substantially eased problems of resource management and reversed trends toward overcapitalization.

I therefore propose in the next chapter that quota systems be adopted or improved in fisheries that lend themselves to this approach.

Mariculture Leases

The progression from open-access fisheries, to restrictive licensing, to specified catch shares represents successively more clearly defined privileges granted to resource users. A further step in this progression would involve issuing exclusive rights to individual fishermen or groups to utilize the resources *in a defined area*. The rights would take the form of leases; like grazing leases, trapping licenses or forest management licenses they would confer exclusive rights to fisheries resources over defined areas. The only examples of mariculture leases on the Pacific coast at present are those issued for shellfish by the Province of British Columbia.

This approach offers all the advantages of quotas noted above, and some additional ones as well. First, if the leases carried an appropriate term, the lease holders would have a strong incentive, not only to harvest the resource in the most efficient way, but also to manage and enhance it. Under a management plan approved by the fisheries authorities, responsibilities for conservation, management and harvesting could be delegated to the lessees, as is the case under provincial grazing and forest licenses. Thus the burden of governmental administration and resource management would be substantially reduced.

With such rights and responsibilities, licensees would have not only an interest in protecting the resource and the habitat from damage by others, but perhaps also some legal grounds for doing so.

This approach also presents particular problems, as participants in my public hearings have pointed out. It would clearly be most applicable to stocks that are relatively immobile, such as shellfish and demersal fish. Highly migratory species would be liable to interception by fishermen outside the lease area, and so could not be assured to the lessee. Furthermore, if the areas were large, such leases might threaten established commercial fishermen in the region or tend to create local monopolies. Significantly, however, much of the rapidly expanding salmon industry in

Japan is based on fishermen's cooperatives which operate hatcheries and harvest the returning fish in particular areas.

This approach also raises some complex legal questions. Federal legislation does not now provide any method of granting exclusive fishing privileges over defined areas. Were it to do so, questions about constitutional authority might be raised.

I am not prepared to recommend here that such a radical departure in licensing policy be adopted for any of our major fisheries. But I do think it deserves careful consideration, especially for certain more isolated shoreline areas where a variety of species are productive and could benefit from management, and perhaps also where small salmon streams offer scope for enhancement. In addition this system might complement objectives relating to more stable and less seasonal employment, and to expanding opportunities for Indian communities and others to participate in the fishery. It also offers a promising vehicle for more intensive resource management and enhancement. If any legal obstacles can be overcome, and if the required cooperation between federal and provincial agencies is obtained, a few, small, carefully designed pilot projects of this kind might well be tried.

Monopoly

For completeness, a final alternative must be acknowledged, namely a private or public monopoly for the fishery. Certainly a single enterprise would eliminate the competitiveness among fishermen and with it the incentives to overexpand the fleet. If it were managed as a profit-maximizing company or Crown corporation, it could be expected to harvest the catch as economically as possible, to take a constructive interest in conservation and resource management and to obtain the highest return for the yield.

However, a monopoly is not to be preferred whenever there is an opportunity for a healthy competitive industry. While the Pacific fishing industry is admittedly in an unhealthy condition and urgently requires restructuring, it has not reached such an irretrievable state that it should simply be turned over to a single corporation, with all the dislocation that would entail. There are less draconian ways to improve industrial performance.

Conclusion

The above are the basic approaches that can be taken in designing a system of commercial fishing privileges. There is an array of possible variations of each. But we do not of course begin with a clean slate, and reforms cannot be implemented without reference to existing policies and problems. Even if the ideal system could be designed, there remains the problem of how to adjust toward it, and the existing pressures on the fishing industry are such that the transition may be painful.

FOOTNOTES

1. Reforming Regulation, Economic Council of Canada. Ottawa, 1981. p. 74.
2. See, for example, Journal of the Fisheries Research Board of Canada, 36(7). Ottawa, 1979.
3. The historical information in this section draws heavily on G. Alex Fraser, License Limitation in the British Columbia Salmon Fishery, Fisheries and Marine Service, Environment Canada. Vancouver, 1977. Technical Report Series No. PAC-77-13.
4. Cited in G. Alex Fraser, License Limitation, p. 1.
5. Cited in G. Alex Fraser, License Limitation, p. 3.
6. Cited in G. Alex Fraser, License Limitation, p. 4.
7. Cited in G. Alex Fraser, License Limitation, p. 5.
8. Sol Sinclair, License Limitation - British Columbia, Department of Fisheries of Canada. Ottawa, 1960.
9. Press Release, Minister of Fisheries. September 6, 1968.
10. P.H. Pearse and J. Wilen, Impact of Canada's Pacific Salmon Fleet Control Program, Journal of the Fisheries Research Board of Canada, 36(7). Ottawa, 1979. p. 764-769.
11. Exhibit # 77, p. 24.
12. N.B. McKeller, Restrictive Licensing as a Fisheries Management Tool, White Fish Authority, Fisheries Economic Research Unit, Occasional Papers Series No. 6. Edinburgh, 1979.
13. Peter H. Pearse, Regulation of Fishing Effort, Food and Agriculture Organization of the United Nations, Fisheries Technical Paper No. 197. Rome, 1980.
14. Sol Sinclair, A Licensing and Fee System for the Coast of British Columbia, Department of Fisheries and Oceans. Vancouver, 1978.

CHAPTER 5

The Licensing System: Problems and Proposals

"... the resource is limited, and the capability of the fishermen is not."

B.C. PACKERS LTD.¹

Today, after a decade of rapid development in commercial fisheries regulation, participation in all of the major fisheries on the Pacific coast is restricted. Licenses are required to fish and the number of licenses is limited. In effect, fishing privileges are available to only the limited number of persons holding licenses issued by the Minister through the Department of Fisheries and Oceans.

CHARACTERISTICS OF LICENSES

While the various forms of licenses differ greatly in their details, they have certain common elements which deserve comment at the outset. Some of these, such as the article to which the license applies, transferability and the level of fees, are subjects of considerable concern and have been discussed at length in the public hearings. A discussion of these features is a necessary preliminary to a discussion of the deficiencies in the licensing system.

Method of allocation As long as access to a fishery is to be controlled, there must be some way of deciding who will receive fishing privileges. In most cases where restrictive licensing has been introduced, the established fishermen or vessels were "grandfathered in" in some fashion. This method minimizes dislocation in overcrowded fisheries, and I support it on these grounds. But it should be noted that there are alternative methods: licensees could be selected on the basis of their qualifications, by drawing lots, or by competitive auction. One of these other methods may be more suitable for a new or expanding fishery. But apart from the need to expand opportunities for certain groups, selecting new entrants is not an urgent problem in any of our major fisheries because they are already overcrowded.

Article licensed Some licenses authorize a person to fish, others authorize a vessel, and a few authorize both. There has been endless debate about the relative merits of "licensing the man" as opposed to "licensing the boat". The essential point is that the choice of the factor to be licensed should depend on the primary objective of the licensing system. Where it is aimed at restricting the amount of capital employed in a fishery, such as vessels and equipment, a

licensing system must focus primarily on these factors. For such fisheries, limiting the number of fishermen or captains would do nothing, in itself, to control expansion of the fishing power of vessels. Licensees would be free to upgrade their vessels and replace them with larger, more powerful and more expensive vessels, at will.

On the other hand, it is possible in some fisheries to design regulatory systems that will avoid creating incentives to invest wastefully in fishing power in the first place. As mentioned in the previous chapter, a catch quota system offers regulators a means of limiting the aggregate catch in a fishery without becoming preoccupied with the nature of the fleet. With the right to take a prescribed quantity of fish, fishermen have a natural incentive to economize on the use of capital and all other costly inputs, without competitively adding fishing power to protect or increase their shares of the catch. Thus there is no need to restrict the number or size of vessels, so licenses need not be tied to vessels. They can simply be issued to individuals, who can be left to take their quota with any vessel they choose.

Transferability Probably the most controversial issue in licensing is that of transferability. To begin to sort out the often confusing debate over this question, a couple of distinctions should be made. First, the issue of transferability is often confused with the quite distinct issue of whether the license is applied to a person or a boat. This may have arisen because the Department has tended to identify personal licenses with non-transferability. However this need not be the case; personal licenses and vessel licenses can be equally transferable.

Second, a distinction should be made between the transfer of a license from one person to another and the transfer of a license from one vessel to another. The latter is related to vessel replacement policy. Transfers between people involve purchase and sale of fishing privileges, and it is in this sense that the term transferability properly applies.

The controversy surrounding transferability centres on several themes: whether it will encourage overcapitalization of the fleet, whether it will lead to monopoly control, whether it invites speculation that causes destabilizing fluctuations in the value of licenses, and whether it permits private parties to gain from the sale of rights to use a public resource. These concerns deserve brief comment.

With respect to the last, the view that individuals or companies should not enjoy financial gain from selling rights to public resources is widely held. It is a reasonable position, and whether one agrees with it depends on one's socio-political inclinations. I find nothing in this Commission's terms of reference which opposes this view; on the contrary, they imply that the Crown should extract the economic gains from the fishery beyond a reasonable return to fishermen and vesselowners. But it is unlikely that the best way to do this is to prohibit transfers of licenses.

It must be recognized that a license to fish in any remunerative fishery will be valuable, and the more successful the

policies for improving economic performance, the greater will be the value of the fishing privilege. This value cannot simply be swept away by making licenses non-transferable. If transfers are prohibited, a license holder will be unable to sell his fishing privilege to someone else, but he can still realise the value it confers on him by exercising it. So the value that licenses confer on their holders cannot be erased by prohibiting licensees from shifting the privilege from one person to another.

In short, the concern about private profits and capital gains from rights to use public resources is misdirected when it focuses on license transferability. If the objective is to improve the economic returns to fishing, and at the same time to prevent the financial benefits from accruing to private parties, then ways must be found to divert the gains to the public. License fees and landings charges can serve this purpose and, at the same time, reduce the profitability of fishing, thereby reducing the value of the fishing privilege. Indeed, if the charges were high enough, the value of a fishing privilege could be reduced to zero.

The concern that transferability of licenses aggravates overcapitalization of the fishing fleet seems to be unfounded. A vesselowner will add to the catching power of his boat whenever he judges that it will be profitable to do so - when he expects that the cost of the extra equipment will be at least covered by the higher volume or value of catch that it will produce. His expectations about this will not be affected by whether his license is transferable.

Similarly, concern about speculation artificially inflating license values appears to be largely exaggerated. Most transactions in vessels and licenses are among fishermen and fishing companies. While some have undoubtedly gained from trading in licenses and vessels, the fluctuations in value have reflected mainly the changing expectations of fishermen and vesselowners themselves about the economic returns from fishing and their financial circumstances. (Apparently, other investors have been attracted to invest in fishing vessels and licenses as a tax shelter, but this is a separate issue, discussed in the next chapter.)

While the objections to transferability seem rather weak, its benefits are substantial. Transferability permits flexible reallocation of fishing privileges among those who can gain the most value from them, while maintaining an arms-length relationship with the government.²

Were transfer impossible, the Minister, the Department, or some delegated authority would have to decide who is to obtain a license and who is to be denied one. This would inevitably require more-or-less arbitrary criteria. Moreover, a fisherman who wanted to withdraw from the fishery would not be able to do so without losing the value of his fishing privileges and probably much of the value of his (unlicensed) vessel and gear as well; this would impose excessive hardship on those who became incapacitated through old age or illness. Special rules could be invoked to permit transfers to next of kin or partners, but this would simply

amount to a form of constrained transferability. Finally, it is extremely difficult to prohibit transfers; experience has shown that restrictions can be circumvented through legal maneuvers involving changes in company shareholdings, personal trusts and so on, which simply raise the cost of effecting transfers.

It seems to me that the only valid objection to license transferability lies in the threat of monopolization or concentration of fishing rights. I think this should be dealt with by means of simple but strict rules that fix a limit to the number of privileges that any person or company may hold an interest in. (I have concluded that such limits should be specified in any event, and I so recommend later in this chapter.) With this protection, and with a system of fees that ensures that the public will receive the value of the resources used in excess of a reasonable return to fishermen and vesselowners, there should be no objection to transferability. Whenever new licenses cannot be issued in overcrowded fisheries, transfers offer the only opportunity for anyone to enter the fishery or for accommodating greater participation by priority groups.

Free transfers will be particularly valuable in promoting fleet rationalization where licenses provide catch quotas, since the licensees can adjust their rights to the most economical amount for their fishing units. The more flexibly the quotas can be divided and combined, the more they will facilitate this kind of rationalization. And in some of our most overcrowded fisheries (discussed below) where the individual quotas must be reduced initially to uneconomic levels, the opportunity to combine them is imperative to improve economic performance.

However, where licenses restrict a dimension of vessel size, dividing and combining them ("pyramiding") affords another avenue for frustrating the control of capacity growth, as experience has shown. Therefore, where this form of licensing is used, transferability and replacement provisions should restrict division and combination of licenses. In these cases, also, whenever a vessel carries licenses for two or more restricted fisheries, restrictions should be placed on separating them through transfers ("splitting"); otherwise more vessels could be added to the fleets.

Fees Existing licenses are highly inconsistent with respect to the charges they impose; license fees vary from zero in the case of a food herring permit to \$2,000 for a roe-herring seine license, and bear little relation to the value of the fishing privileges.

A license fee is an appropriate means of recognizing the value of the privilege to utilize public resources. It is also the simplest way of recovering some of the public interest in the "economic rent" of the natural resources, and hitherto has been the only way. But it has drawbacks. Because license fees are specified as flat rates for particular categories, and fishermen vary enormously in their catch and incomes, they tend to put the heaviest burden on those who utilize the fewest resources. Thus they are an inequitable method of

raising resource revenue. Certainly they fail to ensure that the charges "...are consistent with the value of the resources recovered ...", as the Commission's terms of reference suggest they should.

In contrast, a royalty on fish landed does not have these shortcomings; it relates the amount payable to the Crown directly to the quantity of resources used. A royalty has another advantage over license fees; as mentioned earlier it dampens financial incentives to expand fishing capacity.

During the last decade there has been recurrent discussion, repeated recommendations and numerous announced intentions to implement landings charges. There can be little doubt that a royalty on the catch is the most effective and equitable way of raising revenues from fisheries, and in my judgement this method should be looked to as the primary method in the future development of fisheries policy. Accordingly, I propose changes in this direction in this and the subsequent chapter.

Term and renewability The terms of fishing privileges deserve, in my opinion, much more attention than they have received. Hitherto, all licenses have carried a term of not more than one year. While an annual license might be adequate when access to the fishery is unlimited, when it is limited such a short term affords very little security to fishermen and vesselowners unless it is automatically renewable. But if it is automatically renewable, the term is, in effect, perpetual, and the Crown has very little room to adjust license holdings over time as conditions change. My review of the history of restrictive licensing during the past decade suggests that licensees were indeed encouraged to believe that their licenses would be renewed indefinitely, and this has led to awkward problems in reducing license holdings in overcrowded fisheries.

Although I make no recommendations to this effect in this preliminary report, I think consideration should be given to longer terms for fishing privileges, as are provided in licenses to most other natural resources. A term more closely related to normal planning periods for depreciation of investments would improve the security of licensees and also provide predictable times when the government could modify the privileges granted.

Closely related to the terms of licenses is the matter of their renewability. Most of the existing licenses are automatically renewable providing only that the licensee has exercised his right in the preceeding year or two. These provisions vary considerably without apparent logic; most salmon licenses qualify for renewal if the vessel has recorded as little as one fish landed during the previous two years, while a "C" license holder, who fishes much less valuable stocks, must show five hundred dollars in landings in at least every other license year.

These conditions are directed against idle license holders, but their effect is mainly to induce all licensees to fish in

order to protect their rights. In addition, such provisions encourage false landings reports in order to maintain licenses on vessels not strictly involved in the fishery in a given year. Thus wherever fishing licenses are valuable, or even potentially valuable, very few are not renewed. I see little to be gained from provisions that effectively force all licensees to fish when the main problem is too large a fishing fleet.

The preceding discussion leads to certain general conclusions. As described in the previous chapter, a license can authorize the participation of a person or a vessel in a fishery, it can convey a right to take a certain quantity of fish, or it can grant an exclusive right to exploit an area.

The best form of license must be determined in light of the conditions in each fishery, but in formulating my recommendations I have adopted the following guidelines:

1. When new restrictive licensing arrangements are introduced, they should minimize dislocation of fishermen who have established a dependency on the fishery, and this implies that they should be "grandfathered in" as has been the usual practice in the past.
2. As a general matter, licenses should be issued to persons, but they should apply to vessels as well where the fleet control policy relies on restricting some dimension of vessel capacity.
3. In general, licenses should be freely transferable within explicit limits to prevent undue concentration of fishing privileges.
4. In cases where the licensing system involves limits on vessel capacity, replacement rules must constrain expansion of fishing capacity and restrict division and combination of licenses.
5. Fees levied by the government should be based mainly on the quantity of the resource used by, or reserved for, the individual holders of fishing privileges.

Current Licensing Systems

With the foregoing general commentary and guidelines, I now turn to particular cases. In this preliminary report I do not attempt to deal with every fishery. Instead, I confine my proposals for change to the licensing arrangements for a few of the major fisheries which, for varying reasons, are in urgent need of reform.

Today, there are ten restrictive licensing systems in place for Pacific fisheries, and several others are regulated under special Minister's permits. These are summarized in Table 5-1.

Table 5-1 Summary of licenses for commercial fisheries

licensed fishery	number issued in 1980	licensed factor	factors restricted	license fee
salmon				
ordinary	A 4165	vessel	vessel length	\$200 to \$800 ^a
Indian	AI 378	vessel	and tonnage	\$20
temporary	B 286	vessel		\$20
roe-herring				
ordinary	H			
gillnet	911	person	area fished	\$200
seine	187	person	area fished	\$2000
Indian	HI			
gillnet	399	person	area fished	\$10
seine	61	person	area fished	\$10
food and bait herring ^b		person	landings per trip	
halibut				
ordinary	L 440	vessel	vessel length	\$10
special Indian	10	person	vessel length	\$10
groundfish trawl	T 146	vessel	vessel length	\$10
shrimp trawl	S 244	vessel	vessel length	\$10
sablefish	K 45 ^c	vessel	vessel length	\$10
abalone	E 26	person	catch	\$200
geoduck	G 45 ^c	vessel	vessel length	\$10
spawn-on-kelp	J 28	person	catch	none ^d
selected species	C 1054	vessel	vessel length	\$10

Source: Department of Fisheries and Oceans

^a See text

^b The food and bait herring fishery is not regulated by licenses (as are the others in this table), but by a system of Ministerial permits, as explained in the text.

^c 1981 statistics

^d \$2,000 license fee effective 1982.

As already noted, the various restrictive licensing systems have been introduced over the last decade in response to particular problems facing individual fisheries and they have been designed in light of accumulating experience. As a result, the various systems differ in fundamental respects with no apparent rationale. The terms and conditions of licenses and the way they are administered has not been well documented, so it has proven difficult to sort out some of their complexities.

General provisions for licensing are set out in the Pacific Fishery Registration and Licensing Regulations.³ Some of the regulations are common to all the various license forms: all licenses are valid for one year and are renewable; they must be renewed each year by May thirty-first (except for roe-herring and sablefish licenses, which must be renewed by January fifth and November fifth respectively); all vessels (except roe-herring gillnet punts) are subject to some form of replacement restrictions; and when a vessel with licenses to fish in two or more restricted fisheries is replaced, all of its licenses must be transferred to the new vessel. All of the restricted entry license privileges are transferable between persons by one method or another.

These regulations also provide the Minister with the discretionary power to grant a license to an applicant who would not otherwise qualify, but this prerogative is limited to cases where failure to meet the normal qualifications was due to factors beyond the applicant's control. The Minister

may also suspend a license, or refuse to issue one, if the owner of the vessel is convicted of a violation of the Fisheries Act or Regulations.

In the remainder of this Chapter, I recommend changes in the licensing arrangements for the halibut, food-herring and abalone fisheries, and examine certain other problems as well. These three licensing systems are under heavy strain and my investigations have convinced me that they should be revised without delay in order to facilitate management and to promote rationalization. The more complex problems of the two largest fisheries, salmon and roe-herring, are left to the following chapter. Rationalization of these fisheries will be a considerably longer and more involved process.

For each fishery, I begin with a sketch of the present licensing system and the problems surrounding it. This is followed with specific proposals for reform. My recommendations are designed in recognition of the Commission's terms of reference and the analysis of regulatory problems and objectives in the preceding chapter.

THE HALIBUT FISHERY

During the last few years the organization of the halibut fishery has deteriorated seriously. The new licensing system applied to this long-established fishery has been extremely troublesome and badly managed. In spite of restrictive policies intended to prevent it, the licensed fishing capacity has expanded alarmingly. At the same time, both the available catch and prices have fallen sharply. Submissions made at the public hearings reveal that the administration of fishing licenses has been objectionable to those engaged in the fishery as well as to those excluded.

Background

The halibut fishery is one of the oldest on this coast, and the stocks among the most valuable.⁴ It has a long history of regulation. By the early 1920's, it had become obvious that the major stocks off northern British Columbia and Alaska were being severely depleted by over fishing. In response to this, and because of the transboundary nature of the stocks, Canada and the United States jointly signed the Convention for the Preservation of the Halibut Fishery in 1923.⁵

Under this Convention, the International Fisheries Commission was created. (It was renamed the International Pacific Halibut Commission in 1953.) The Commission was made responsible for recommending to both governments regulations for improving the biological management of the halibut fishery. Under the Convention, Canada and the United States signed a declaration of intent to comply with the regulations recommended by the Commission, which itself had no powers of enforcement.

The initial conservation measure imposed under the auspices of the Commission was a three-month closed season. This proved to be inadequate, and in 1930 the Commission was granted greater powers which enabled it to set catch quotas by area, to regulate gear and to close nursery

areas. Since then, the Commission has set a total allowable catch for each of three administrative areas in the north Pacific. However, because the Commission itself had no authority to regulate participation in the fishery,⁶ the fleet expanded under unrestricted entry. Thus the fishing season had to be progressively shortened to a few weeks per year.⁷ Nevertheless, for some years the Commission's policies appeared to be succeeding in restoring the stocks.

The evolution of the halibut fleet is a vivid example of how an open-access fishery operating on valuable stocks will tend to attract excess capacity. The first result was stock depletion, which is the problem that the Commission was set up to deal with, and did so with some success. But events illustrate that stock management will not alleviate the excess capacity problem as long as access to the fishery is unregulated. As the stocks were rebuilt and the value of halibut increased, the fleet expanded. Progressive shortening of the season meant that the fleet was idle most of the year. Shore facilities had to cope with the whole catch in a short period, leading to increased capacity, higher costs and instability of operations. Nearly all the catch had to be frozen; the fresh market, which brings higher prices, could be served only briefly. And, of course, with all this excess capacity and cost, returns from these highly valued resources remained low.

Recently, two events put new pressures on the industry. During the late 1960's and early 1970's catches declined dramatically as did the apparent size of the stocks, due partly to environmental changes but mainly to incidental catches of halibut by foreign high seas trawl fleets. Because of the longevity and late maturation of halibut, the stocks cannot recover quickly, and they remain in a depressed condition today. The stocks off northern British Columbia, which depend on young fish migrating from the north, have been recovering particularly slowly, and there is growing anxiety about their apparent displacement by large populations of dogfish.

The other event was the declaration of 200-mile fishing limits by Canada and the United States toward the end of the 1970's. Initially, reciprocal privileges for fishermen who had been operating in the other country's waters were provided for, but disagreements and conflicting pressures led to termination of these arrangements. As a result, U.S. fishermen were excluded from fishing within Canadian waters in 1979, and Canadian fishermen were phased out of the Alaskan fishery by 1980.

The impact on U.S. fishermen was relatively light, but because two-thirds of the Canadian halibut catch had been taken in U.S. waters off Alaska, the impact on Canadian fishermen was substantial. The Canadian fleet is now restricted to that part of Area 2 that lies off British Columbia (Area 2b). An agreement between the two countries provides that 60 percent of the allowable catch in this area be allocated to Canadian fishermen and 40 percent to the U.S. fleet.

Restrictive Licensing

As long as Canada and the United States had no agreement on how the catch was to be shared, neither could benefit from controlling the expansion of its fleet: any limitation would simply result in the other country taking more of the catch. But in 1979, when the division of the catch of the remaining international stocks was specified, this obstacle to controlling the fleet was removed. Moreover, with the catch available to Canadians now greatly reduced, the need to control and reduce the fleet size had become acute.

The Canadian government therefore imposed restrictive licensing in the halibut fishery in 1979. New halibut ("L") licenses were issued to vessels that had reported halibut landings of at least 3,000 pounds (dressed, head off) in either of the preceding two years. Initially, the landings qualification had to be met with halibut caught on gear other than troll; the traditional halibut fishery uses mainly longline gear, and this rule was intended to exclude salmon trollers who caught halibut incidentally. This eligibility criterion was met by 281 vessels, and another 50 or so were found to be eligible after errors in sales slip information were uncovered. About 400 fishermen who had fished halibut did not meet the license requirements and were excluded from the fishery. These were mostly part-time halibut fishermen who operated small boats and in total they accounted for less than 20 percent of the catch.⁸

The government took several steps to minimize the dislocation caused by these new arrangements. Longline vesselowners who failed to meet the entry qualifications were offered compensation for their longline gear. Those who had fished mainly in Alaskan waters and had licenses to fish in other fisheries were encouraged to retire their halibut licenses by the offer of compensation for their gear and a "vessel-share" grant. Alternatively, these fishermen could relinquish their halibut licenses in return for a vessel and gear conversion grant to enable them to enter the sablefish fishery. Of the 54 vessels excluded from Alaska and eligible for these grants, 16 surrendered their halibut privileges under the scheme; the remainder received halibut licenses.

However, shortly after the new restrictions were introduced they were relaxed, and generous grounds for appeal were provided. Because of the difficulty in determining how the halibut had been caught, the exclusion of troll-caught landings from the qualifying catch was lifted. The Minister announced also that appeals would be considered from those who could not meet the landings qualification but could demonstrate "substantial financial dependency" on halibut fishing and could not turn to other fisheries. Also, consideration was to be given to vesselowners who could show a "significant financial commitment" to the fishery, including some who had introduced boats just prior to the new restrictions and therefore did not meet the landings qualification. The Appeal Board was faced with a flood of appeals, and some 100 additional licenses were approved.

The result of the low landings qualification and generous appeal provisions was that, by 1981, the licensed halibut fleet had expanded to 422 vessels. In addition, 10 special Indian halibut licenses are issued on an annual basis to individuals who depend on halibut for a significant proportion of their income, but do not own the vessels which they operate. This compares with less than 100 mainly halibut vessels which operated prior to the introduction of restricted entry, in spite of the fact that the fleet now has access to only a fraction of the stocks previously accessible.

This year, the quota available to Canadian fishermen was 5.4 million pounds (compared to a catch of more than 30 million 15 years ago), and because of low stocks, the catch rates have been very low. Furthermore, the landed price this year has declined to less than \$1.00 per pound, less than half the price of two years ago. Thus the circumstances of the fishery have deteriorated sharply and are now critical.

Halibut licenses are applied to vessels and are transferable (except for the special Indian licenses). They authorize fishing for halibut by hook and line gear, and by troll gear during the open season, at a fee of \$10 dollars per year. If replaced, the replacement vessel must not exceed 110 percent of the length of the vessel replaced.

Incidental Troll Catch

A particularly aggravating issue relates to the treatment of halibut caught incidentally by salmon trollers. Trollers for chinook salmon cannot avoid hooking halibut occasionally in certain waters, even if they do not "target" on this species. But in order to provide a larger catch to halibut longline fishermen who were displaced from Alaskan waters, the Department has prohibited retention of troll caught halibut since 1979.

Many trollers now feel aggrieved at having lost the privilege to retain incidentally caught halibut. Their discontent was aggravated when those trollers who could show landings of 3,000 pounds (at a time when the pressure on the stocks was already excessive) were made eligible for halibut licenses. Worse, they were made eligible not just to continue to catch halibut incidentally during the open season (as they had been doing) but also to add longline gear specifically for halibut fishing, thus increasing their halibut capacity and adding to the excess capacity of the fleet.

The non-retention rule applied to salmon trollers presents a vexing problem. In principle, the release of marketable fish makes little sense economically, and inevitably results in some mortality and waste. The present arrangements aggravate losses because the mortality of released fish depends upon the care taken in handling them, and having been denied the right to participate in the halibut fishery, salmon trollers have little incentive to release them with care. I find it difficult to disagree with the principle that fish caught should be landed (unless there is a sound biological reason against this; here, it is only a question of who catches them). But if trollers were allowed to retain halibut, a great deal more fishing capacity could be brought to bear in an already

overcrowded fishery. Some advocate a return to a specific limit on retentions, but this is difficult to administer and in any event would not discourage targeting on halibut up to the prescribed limits. So none of these solutions is very satisfactory.

Proposed Changes

In spite of good intentions, the licensing of the halibut fishery has been badly regulated over the last few years, and the result is a grossly overexpanded capacity in the licensed fleet and much reduced stocks. What is urgently needed now is firm action to rationalize the fleet to the available catch. In view of the current pressures on the fishery this will be difficult, but the longer it is postponed the more dislocation it will cause.

Fortunately, the characteristics of this fishery lend it well to a simple fishermen's quota system. The allowable catch does not fluctuate widely and can be (and is) predicted in advance of each season. A quota system is the only approach, as far as I can see, that offers any real promise in dealing with the alarming excess capacity in this fishery, and if it is carefully designed, it appears to offer a more equitable solution than any other.

I therefore recommend the following changes:

1. The present halibut vessel licenses should be replaced by a simple license issued to a person. To accomplish this, the owners of licensed halibut vessels should designate a person (or his company) to be the succeeding licensees.
2. Each of these licensees should be given an initial catch quota, denominated in 200 pound units. (In application, this will probably become 100 kilogram units; I prefer to use the more familiar units of measurement here.) To introduce these quotas, the total allowable catch (less a reserve, described below) should be divided among the licensees in proportion to their shares of the total Canadian catch averaged over the two years 1980 and 1981. In subsequent years, quota holdings should be adjusted in proportion to necessary changes in the total allowable catch.
3. The quotas should be freely transferable in 100 pound units, so long as the total possessed by any licensee does not exceed the limits proposed later in this chapter. There should be a requirement that all transfers be reported to the Department within 15 days.
4. A significant fee, in the form of an advance royalty, should be introduced immediately and related directly to the catch authorized and registered under each license. I suggest an initial annual fee of \$20 per 200 pound unit (i.e. ten cents per pound) of quota, payable upon license renewal. It should be an announced intention to revise this rate periodically. The license itself should continue to be issued at a nominal charge, but I suggest it be increased to \$50.

5. Licensees should be free to take their quota on any hook-and-line gear. The longstanding prohibition on trawls should be maintained because they are indiscriminating and destructive to immature fish.
6. With the total catch predetermined and limited through the authorized quotas, the fishing season should be expanded to the maximum period that biological constraints permit.
7. Captains of vessels landing halibut should be required to declare the number of the license under which they land halibut, and licensees should be liable to strict penalties for any landings in excess of the quota authorized under that license, as proposed later in this chapter.
8. A reserve of 10 percent of the initial quota should be withheld in making the initial allocations to the halibut licensees to provide a reserve for allocations upon the recommendations of a "special" temporary appeal committee consisting of representatives of salmon trollers associations and halibut licensees. (Such committees are described later in this chapter.) Appeals within a short deadline should be invited from "outside" salmon trollers who can demonstrate that the restrictive licensing of the halibut fishery adversely affected their incomes, and from halibut licensees who can demonstrate that the initial allocation of quotas would treat them inequitably. Allocations through this appeal process should be subject to payment of the advance royalty and license fee. Any portion of the reserve remaining after appeals have been considered should be added, *pro rata*, to the quotas available to halibut licensees.
9. The government should reserve the right to adjust quotas proportionately in response to changes in the catch available to Canadian fishermen.
10. A committee of halibut license holders should be appointed to advise the Department on the mechanics of implementing these changes and to design clear guidelines for dealing with appeals.

These measures imply substantial change from the traditional method of regulating this troubled fishery. The main difficulties lie in achieving an equitable transition from the present unsatisfactory arrangements. Once in place, they should go a long way toward improved economic returns, fleet rationalization and simpler management and administration.

The proposed "grandfathering in" of licensees' quotas according to their recent catch shares appears to be the most equitable way of recognizing the difference between those who comprise the main halibut fleet and those who qualify for licenses by way of incidental catches. The proposals are intended to secure the position of each, and transfers of quotas will provide an avenue for voluntary withdrawal from the fishery without loss or arbitrary intervention.

These arrangements will also alleviate the nagging problem of halibut caught incidentally by salmon trollers. The

new personal halibut licenses need not be restricted in number (they will simply identify quota holders and designate quota entitlements) and trollers will be free to acquire quota units as they see fit.

A major benefit of the proposed arrangements will be that the fishing season can be lengthened. This will enable higher prices for the catch because a higher proportion will be available for fresh fish markets, which bring prices about half again as high as the frozen market. Especially if the Alaskan fleet continues to be constrained by its present closed season, Canadian fishermen can be expected to take their catches at other times when most could be sold in the lucrative fresh market.

The proposed royalty, applied to a total allowable catch equal to this year's, would yield \$540 thousand. This is, incidentally, roughly the amount of Canada's contribution to the International Pacific Halibut Commission.

Upon introduction of these arrangements, numerous appeals can be expected, so it will be important to specify rigorously the grounds upon which appeals will be considered. The proposed appeal committee will have access to the landings records of the Department and, in addition, to the landings files kept by the International Pacific Halibut Commission. (For many years the Commission has required compulsory filing of logbooks by halibut fishermen. The information about where the catch was taken must be kept confidential, but that is not needed for these purposes.)

Experience elsewhere suggests that fishermen do not always take their full quota for one reason or another. Canada should therefore seek arrangements through the International Pacific Halibut Commission to provide that any Canadian quota not harvested would be added to the Canadian quota for the following year.

Finally, special attention must be paid to enforcement of regulations, especially the one requiring accurate recording of landings. Fortunately, the International Commission already has in place an excellent system for collecting detailed information on all halibut landings in British Columbia and U.S. Pacific ports. The penalties proposed later in this chapter will assist in this matter as will the obligation of fish buyers to provide accurate landings statistics, proposed in Chapter 6.

THE FOOD AND BAIT HERRING FISHERY

The significant food-herring fishery that developed during the mid-1970's has since levelled off. Hopes of penetrating the high-value European market have not been realized for a variety of reasons, one of which has been the difficulty encountered by B.C. producers in matching the price and quality of product available from elsewhere, such as the Atlantic provinces. Recently, the main market has been Japan, where dried herring are sold as *migaki*.

Nevertheless, this fishery offers considerable opportunity. Herring are in their best condition for food in the late fall,

when the major fisheries are closed. Consequently, this fishery can advantageously employ vessels and crews, shore-workers and plant capacity that would otherwise be idle. Markets for food herring are extremely sensitive to quality but, with improvement in standards of fish handling and processing, at least some experts believe that there are good opportunities for this fishery to penetrate markets.

The catch is taken mainly with seine gear in Georgia Strait, where a much larger catch is taken from the stocks in the spring roe-herring fishery. One of the implications of this is that the allowable catch can be determined well in advance because it represents only part of the stock's total yield. There appears to be no reason to expect that the 1981 quota of 10 thousand tons cannot be maintained if the roe-herring industry is well managed. But the present system of regulating the food-herring fishery itself is an impediment to its development. This fishery is regulated under special Ministerial permits issued to persons annually without charge, though each must specify a vessel. These permits are unrestricted in number.

Most of the regulations applied to the food-herring fishery are aimed at protecting the quality of the catch. Thus, permits are issued only to those whose vessels have certain refrigeration equipment. In addition, each vessel must deliver its own catch; landings are restricted to 25 tons per delivery; and the catch must be delivered to a processor within 18 hours. All of these conditions are due to the sensitivity of the market to careful handling of the fish on vessels and in the processing plant.

For the most part, the quality objectives of these regulations have not been met. This is because access to the fishery is (apart from the refrigeration requirements) effectively unrestricted and because the fleet has expanded to the point where it has become unmanageable in the brief, frenzied openings. Moreover, the door has been left open to additional entrants by a commitment from the Department that past participation will not be a precondition for access to this fishery.

In the last few years this fishery has become chaotic. A fleet with fishing power far in excess of that required to take the catch has converged on available stocks. Fisheries officers have set production targets for each area of 1,500 tons, which is the estimated maximum plant capacity, and attempted to hold the catch to that level by shortening the fishing period. But in the face of a fleet with something like 20 times the needed capacity in an area, the task has proven almost impossible. For example, fisheries officers faced with a large stock of herring in Stuart Channel in 1980 tried in vain to limit a fleet of 100 seiners to a catch of 1,500 tons. In an opening of only 27 minutes, 4,000 tons were caught. As a result, landings far exceeded plant capacity, the 18 hour delivery rule had to be waived, and because of poor quality a large proportion was unsuitable for food.

The other regulations imposed to offset these problems have been difficult or impossible to enforce. A seiner can

often catch much more than 25 tons in a set, so if it limited its delivery to that amount it would have to dump the excess; instead, a vessel that makes a large set cooperates with others that make repeated deliveries to the processing plants, thereby thwarting the catcher-delivery rule. The requirements for refrigeration equipment have not been enforced, and some vessels have not carried it or utilized it appropriately. Finally, the policy of controlling catches by progressively shortening the opening time, while the fleet size remains unlimited, is both impractical and wasteful. In 1980 the food and bait herring fishery was open for a total of only four hours. Catches cannot be properly regulated, gluts exceed plant capacity and large quantities of fish are spoiled.

There are certain other disturbing effects of this system. It has effectively eliminated gillnetters and trawlers, not because they are any less suitable for food-herring fishing, but because the openings are so short they cannot take reasonable catches. Indeed, the ability of these vessels to select only the large fish best suited for food, and to cool the catch rapidly, might otherwise give them an advantage.

Similarly, some of the smaller processors, who prepare products for high quality food markets, cannot now participate in the fishery because they are unable to obtain assured quantities of high quality fish.

The present regulatory system is obviously inadequate, and in my opinion the waste and inefficiency associated with the food-herring fishery should be tolerated no longer. Fortunately, the special circumstances of this fishery lend themselves well to reforms that would convert the licensing arrangements to a simple personal quota system which would significantly improve the performance of this industry. To this end, I recommend that the following steps be taken:

1. The present Ministerial permit system should be abolished and replaced with a personal license to fish herring for food or bait, in amounts governed by the holdings of quota under each license.
2. In view of the Department's stand that participation in this fishery will not be limited to those who have participated in the past, all owners of vessels that meet the current refrigeration requirements should be eligible to receive an initial quota. The eligibility of each applicant should be confirmed by vessel inspection.
3. Quotas should be specified in units of 10 tons, and the initial quota allocations should be equal, i.e. the total allowable catch should be equally divided among the eligible applicants.
4. A fee in the form of an advance royalty should be levied according to the quota held by each licensee, to be paid at the time of issuance and subsequent renewals of licenses and quotas. To discourage excessive numbers from initially applying to enter this fishery I suggest a substantial fee, of \$500 per 10 ton quota unit; this is in

the order of 15 percent of the 1980 landed price and the average price is likely to be slightly higher this year.

5. The quotas should be freely transferable in 10 ton units within the limits allowed any licensee described later in this chapter. It should be required that all transfers be reported to the Department within 15 days. The number of licenses themselves need not be restricted and should be issued at a nominal charge of \$50.
6. Captains of vessels landing food and bait herring should be required to identify the license under which they are operating and licensees should be subject to penalties (proposed below) for any landings in excess of the authorized quota.
7. The government should reserve the right to reduce quotas if stock conditions so dictate. Any such changes should be made well in advance of the season to enable orderly planning and redistribution of quotas.

With the total catch fixed by quotas, the currently tight restrictions on fishing time can be relaxed. This can be expected to result in much improved handling of fish and better use of vessel and plant capacity.

The present catcher-delivery rule, the limit on the size of deliveries and restriction on delivery time should all be abolished. Processors and fishermen will probably find it advantageous to contract for landings over particular periods to smooth operations and take best advantage of fish quality. In the more orderly fishing that will result, it should be possible to improve substantially the quality of fish delivered and there will be strong incentives to do so. With fewer regulations of this sort, surveillance and inspections can concentrate on accurate recording of landings.

The holdings of quotas can be expected to be redistributed through transfers among licensees seeking economical, efficient-sized operations. Or, some licensees may choose to pool their operations, as has been done in the past. Either way, the number of vessels operating in the fishery will be reduced, through voluntary arrangements, to a smaller number than has recently engaged in this fishery. Fewer vessels and fewer, larger landings should ease the burden of management and inspection.

It is to be hoped that some licensees will experiment with gillnetting and trawling for food herring. With a longer season and assured opportunities to make a catch, they will undoubtedly be in a better position to test the superiority of these gears in terms of recoverable values, stock management and product quality. Small processors and special product producers should benefit from being able to guarantee buyers the quantity and quality of product they need, and from being able to contract with licensed fishermen to supply the herring.

Further consideration should be given to certain additional measures for the future. One is a systematic grading system for the product to provide foreign buyers with better assurance of the quality of fish they are buying. Another is

the specification of quotas by areas (instead of attempting to manipulate the distribution of the catch by openings and closures). Methods for allocating any additional available quotas in the future must be developed. The royalty rates and penalties should be reviewed regularly. And finally, consideration should be given to incorporating into this system the nine separate forms of "special herring permits" now provided for particular minor uses of this fish. These are already issued to persons and specify quotas.

THE ABALONE FISHERY

The small but lucrative abalone fishery is concentrated in northern waters. The rest of the coast, including all waters south of Cape Caution, is closed in order to reserve abalone for native Indians, who have traditionally taken this shellfish for food, and for sportfishermen.

The abalone ("E") license was introduced in 1977 to restrict entry into a fishery that had developed suddenly, become overcrowded and was depleting the resource. Licenses were issued at a fee of \$200 to vessel operators who had landed more than \$2,000 worth of abalone and earned more than half their fishing income from abalone in either of the two preceding years. After appeals were considered, 26 fishermen qualified for licenses.

Initially, the catch of each licensee was unrestricted, and in the first two years the total catch exceeded a million pounds, well in excess of the sustainable yield. Some larger enterprises had landed more than 100 thousand pounds each. As the virgin stocks were run down, the catch had to be substantially reduced. In 1979 the coastwide allowable catch was fixed at 500 thousand pounds. The next year it was halved again to 250 thousand pounds. In 1981 the allowable catch was reduced yet again to 200 thousand pounds. This current level may be roughly consistent with the sustainable yield.

The excessive fleet and the need to reduce the catch resulted in new measures to control operations. In 1979 one half of the 500 thousand pound allowable catch was exploited competitively in the early part of the year; the remainder was then divided equally to provide a catch quota to each licensed fisherman. Since 1980, the entire catch has been divided in this manner, providing individual quotas of 9,600 pounds in 1980 and 7,700 pounds in 1981 for each of the 26 abalone licensees.

The license is issued to persons, rather than vessels, but the licensee must designate the vessel he will use, in which he must own a majority interest. Only one license was available to each qualifying fisherman, so that each quota was intended to be taken with a different vessel.

The basic structure of the abalone license system is excellent. Since the license is issued to persons and conveys the right to take a specified catch, it provides a direct mechanism for regulating the total allowable catch. Fishing can take place all year round, and restrictions on vessels and gear are minimal. Moreover, this system has eliminated the

incentive of vesselowners to competitively expand their fishing capacity beyond that required to efficiently take their quotas. The only serious problems in this system arise from the unnecessary supplementary restrictions on license holders. If the requirement that each licensee own a vessel and use it to catch his quota were strictly applied, this would force 26 vessels to operate in this fishery each year. This serves no useful conservation purpose and is economically wasteful. Moreover, I see no justification for a licensing policy that requires individuals to own their own vessels, at least where a quota system is employed.

As the quotas have been reduced, individual operations have been forced well below an economically efficient size. This has put a heavy strain on the system, and legal techniques have been found to circumvent the restrictions that each quota must be exercised from a separate vessel.

To overcome these problems and to allow rationalization of the abalone fishery, I recommend the following changes:

1. The abalone license should be maintained as a license issued to a person, and it should authorize licensees to take a catch equal to the amount of quota they hold under their existing licenses.
2. The existing regulations that attempt to restrict transfer of licenses, division and combination of quotas, and the vessel to be used by the licensee, should be abolished. This will allow the holdings of quotas to be rationalized among the abalone fishermen. Many of the presently small quotas will then probably be legally combined into more economic units through voluntary transfers, within the limits on individual holdings described below. It should be required that transfers be reported to the Department within 15 days.
3. The quotas should be renewable annually, but the government should reserve the right to adjust them proportionately in light of needed changes in the total commercial catch. Any such changes should be announced well in advance to enable orderly planning and redistribution of quotas.
4. The annual advance royalty fee for an abalone license should remain modest, but I suggest that it be raised to \$50 mainly to cover administration costs. However, a significant charge should be levied against the licensees' authorized catch. I suggest an advance royalty rate of 25 cents per pound of quota held under each license, payable at the time of license renewal. This implies substantially higher charges than hitherto, but with the landed prices of abalone in the order of \$4.00 per pound it should leave adequate returns to operators, particularly if they take advantage of the new opportunities to rationalize operations and reduce average operating costs.
5. Captains of vessels landing abalone should be required to declare their landings, and licensees should face strict penalties if landings declared under their licenses exceed their quotas, as proposed later in this chapter.

I expect that abalone fishermen will welcome the changes (with the probable exception of the fee increase). The proposed elimination of the cumbersome restrictions on the vessels to be used in this fishery should simplify the Department's management problems. Moreover, the fewer, larger deliveries that can be expected to result from these changes should lighten the burden of inspections and enforcement. Certainly the economic performance of the fishery should improve as well as the efficiency of administration.

Certain additional matters deserve consideration for the future. For example, it may prove to be desirable to determine the total allowable catch of abalone by specific geographical areas and to identify licensed quotas with these areas. This could eliminate competition among licensees for the same resources and encourage each to protect and manage the resources of his specified area. The level of royalties and fees should be reviewed regularly.

The abalone resource is under pressure from non-commercial fishermen, and there are indications of commercial sales by unlicensed divers. These present enforcement problems beyond the regulation of the commercial fishery, so I will not comment further on them here.

OTHER FISHERIES

The following chapter is devoted to the salmon and roe-herring fisheries. Table 5-1 indicates that in addition to these and the fisheries discussed in this chapter, restrictive licensing systems are now in place for six other fisheries: the groundfish and shrimp trawl fisheries, sablefish, geoduck, spawn-on-kelp and selected species. I postpone consideration of these to my final report.

In addition to restrictive licenses for regulating access to fish, the Department administers licenses for fish packers and processors as well as a variety of permits for special purposes. I postpone consideration of these as well. In the remainder of this chapter I briefly examine the provisions for personal commercial fishing licenses, sketch the issue of regulating commercial sportfishing, and propose certain changes in general licensing policy.

PERSONAL COMMERCIAL FISHING LICENSES

A longstanding element of the regulatory system for commercial fisheries is the license required of all persons who fish on commercial fishing vessels. The regulations under the Fisheries Act specify that to qualify for one of these licenses a person must be a Canadian citizen, or if not a citizen, one who has served in the Canadian Forces or has been a landed immigrant resident in Canada for less than three years. There is no restriction on the number of licenses issued.

These licenses were introduced many decades ago, under quite different circumstances from those that prevail today. Whatever the objective that prompted introduction of these licenses, it is time to reconsider whether they serve any useful purpose.

The first question is whether the requirement of citizenship or landed immigrant status serves any function. Today, there are well-established regulations governing the employment of non-citizens under the Immigration Act, which controls the employment of aliens, so special rules for the fishing industry seem to be redundant.

The second question is whether the license serves any useful purpose at all. It has been suggested that since it is revocable for infractions of the fisheries regulations, the license can serve as an enforcement tool and in a few cases the Minister has cancelled the licenses of fishermen who have been guilty of repeated infractions. But today, when all fishing is regulated under specific privileges in the form of licenses, permits or leases, it would appear to be more appropriate to put the full onus of responsibility for any infractions on the holders of these fishing privileges, rather than on the individuals employed by them.

It has been suggested also that these personal licenses are useful for statistical purposes. But other industries do not require everyone engaged in production to be licensed; and there are other much less burdensome ways to obtain estimates of numbers employed.

I have been told in hearings and meetings that the personal commercial fishing license is the source of much inconvenience to fishermen, especially those in communities where there is no resident issuing officer. They must often travel considerable distances to find an officer of the Department of Fisheries and Oceans and then if he is not readily available or if they produce insufficient evidence of citizenship, inconvenience is magnified. Moreover, there are recurrent cases of fishermen being unable to produce their licenses on demand because they have forgotten them at home or deliberately refrained from carrying them in wet fishing conditions. This has led to charges or more often to friction with the authorities.

In 1981 the fee for these licenses was doubled from \$5 to \$10 on the grounds that the former fee, which yielded a total revenue of roughly \$95 thousand, was insufficient to cover the cost of administering them. I do not regard these licenses as an appropriate method of raising revenue from the fisheries; charges related directly to the privilege to harvest fish are much more suitable.

All these considerations lead me to doubt the usefulness or desirability of these licenses. Unless there is stronger justification for them than has so far been presented to the Commission, I am inclined to propose that they be abolished. But I shall postpone any recommendation to my final report in order to give an opportunity for further study and commentary on this problem.

COMMERCIAL SPORTFISHING

The provision of services to sportfishermen has become a significant sector of the tourist industry on the Pacific coast. Rapid growth in sportfishing over the last two decades has substantially increased the demand for fishing guides,

charterboats, accommodation and a host of other goods and services required to support this activity.

There is a surprising amount of debate about whether guiding and charterboat operations constitute recreational or commercial fishing activity, but I have no hesitation in classifying these businesses as commercial. However, they differ fundamentally from the sector usually referred to as the commercial fishery because they are concerned mainly with the production of sportfishing services and opportunities rather than the production and sale of fish.

In my final report, I intend to make recommendations relating to the regulation of commercial sportfishing operations and guiding. Here, I identify some of the arguments for regulation that have been raised in public hearings and deserve further consideration.

Charterboats A number of participants have proposed that charterboats be subject to restrictive licensing, as are other commercial fishing vessels. Several matters are relevant in considering this proposal:

1. Charterboat operations have expanded considerably on the west coast in recent years.
2. The main purpose of restrictive licensing for the commercial fisheries is to control the tendency toward expansion of excess fishing capacity, but no corresponding problem of excess capacity exists in the provision of sportfishing services.
3. The licensing of foreign charterboats, which had increased in number to 175 in 1979, was suspended in 1980. A new regulation this year prohibits sportfishing from a foreign vessel that provides catering or guiding services.
4. The sportfishing regulations introduced this year require all anglers, including those who fish from charterboats, to purchase licenses which carry higher fees for non-residents.

The main argument for licensing charterboats is to limit demands on fish stocks. This, in turn, raises questions about the numbers involved in this industry and the quantity of fish they catch. At present, statistical information is sparse, but in response to advice to the Minister last fall,⁹ the Department is now conducting a survey of charterboat businesses and canvassing operators about alternative regulatory arrangements. I hope the results will be available before I write my final report.¹⁰

Several basic questions must be answered before any restrictive licensing policy is adopted for charterboats. What would be its purpose? With all sportfishing now regulated by licensing of individuals, the special purpose to be served by restricting the services available to sportfishermen must be clearly identified. What would be the rationale for distinguishing, as a matter of policy, between those sportfishermen who fish from rented boats and those who use their own boats? What would be the effect of such a change on

the stocks? Hitherto, the absence of information about catches has confused the discussion, but the new sportfishing licenses and the survey of operators this year should provide much better data. And what would the scope of a licensing scheme be? Charterboats range from large, elaborate floating resorts to small guided boats available for hire by the hour, and there are hundreds of enterprises that rent boats in connection with resort and marina services.¹¹

Sportfishing Guides Hitherto, saltwater sportfishing guides have been unregulated in Canada. A form of regulation by licensing, akin to the licensing of guides for hunting and freshwater fishing by the British Columbia Fish and Wildlife Branch, has frequently been suggested in the public hearings and meetings.

The 500 or so saltwater sportfishing guides are, in a real sense, commercial fishermen working on a wide variety of vessels and under varying arrangements with customers and employers. Some are full-time career guides, often with substantial investments in vessels and equipment and long experience; a larger number are seasonal employees; students and men and women who take other winter employment. They are unorganized except for one or two local associations, which are concerned mainly with market promotion.

The arguments most frequently used to support guide licensing are as follows: it would identify those involved in guiding and improve communication and a sense of professionalism among them; it would provide a vehicle, through suspension or cancellation, for enforcement of safety rules and fishing regulations; it could be used as a device for establishing standards of service and qualifications; and it could be a means of raising revenue. But as others have pointed out, the Department of Transport regulations already cover matters of safety, there are other means of enforcing fishing regulations, and the other issues are mainly the business of guides themselves. Furthermore, easily available and even casual guiding services are a valuable adjunct to the tourist industry and provide considerable summer employment, which few would want curtailed. These are matters that I will consider before writing my final report.

NEW GENERAL REGULATIONS

Certain new provisions are required to secure the objectives of licensing and general rationalization of the commercial fisheries. These changes should be made at the time the proposed new licensing systems are introduced, although they are desirable even under the existing arrangements.

Protection Against Concentration of Fishing Privileges

Historically, fishermen have been anxious about the influence of processing companies in the primary fishing industry, and restrictive licensing has added to apprehensions about concentration of fishing privileges in a few corporate hands. Measures to control concentration, integration and monopolistic tendencies are justified in order to maintain a vigorous and competitive industrial structure.

At an early stage in the salmon fleet control program, an understanding was established between the Minister of Fisheries and the members of the Fisheries Association of British Columbia that its members would not expand their share of the licensed salmon fleet, which was then 13.2 per cent. As explained in Chapter 3, this share has not been exceeded, but there are many indirect methods of gaining control over vessels other than outright ownership: partial interests, shares in fishing companies, mortgages and a variety of other arrangements can provide an interest in vessels. In any event, the limit on fleet ownership by processing companies is informal and hence is not legally binding.

Two other circumstances make early attention to this matter essential. One has to do with recent developments in the organization of the processing industry, which have led to greater concentration of ownership, and new linkages between firms. The second is the new restrictive licensing of small fisheries, which offers easier opportunities for one or a few operators to gain excessive control of them. In addition, the proposed new licensing arrangements, as well as most of the existing ones, provide for transfers of licenses, and while there are many advantages to this (explained above), provisions are needed to prevent excessive accumulation of rights in one or a few hands.

I therefore propose new regulations that will prohibit any additional transfers of fishing privileges to fish processing companies, and strictly limit the share of the total quota that may be held by any person where quota systems are adopted. Because such controls have often proven difficult to enforce, they should be designed carefully and unambiguously. I therefore make rather detailed proposals on this matter, drawing upon experience in other industries.

These proposals will permit processing companies to retain their existing interests in fishing rights, but would not allow them to increase their holdings of licenses through transfers from others; in effect, their initial holdings will constitute an upper limit. Second, an upper limit in the form of a percentage of the total will apply to the eligibility of any person to hold quotas where fisheries are regulated by this method. The required changes in regulations are as follows.

1. Regulations under the Fisheries Act should require that all transfers of restricted licenses must be reported within 15 days and, where quota systems are used, all transfers of quotas should similarly be reported.
2. The regulations should prohibit transfers of restricted licenses to any person or corporation that has an interest in a fish processing facility, and of any quota to licensees who already hold the specified maximum percentage of the total. I suggest that this limit be fixed at 5 percent for all fisheries regulated by quota except for shellfish fisheries, where the limit should be 15 percent.

Both the reporting requirement and the transfer prohibition should apply to any transfer of fishing privileges "or any beneficial or other interest" in them, so that trusts and related arrangements could not be used to circum-

- vent the regulations. The penalty for violating these provisions should be stiff, that is, fishing privileges should be cancelled without compensation.
3. The reporting requirement and the restrictions on transfers of quotas should include transfers of shares of incorporated quota holders that change the control of the quota.
 4. These provisions should not apply to licensees who use their fishing privileges as security under *bona fide* financing arrangements, such as with a bank. That is, a mortgage or pledge should not be regarded as a transfer. However, in the event that the financier forecloses but is ineligible to take control of the rights under the limits outlined above, he should be required to dispose of them within a specified period. This will enable fishermen to obtain needed financing, but will prevent any company from expanding its foothold in the fishery through default of loans.
 5. The regulations should provide precise definitions of "control" (for the purpose of item 3 above) and "beneficial interest" (for item 2), which should cover rented privileges, and of "processing facility," which would include holdings of parent, subsidiary and affiliated companies to ensure that the controls are not thwarted by corporate manipulations.

These proposals are generally consistent with the policy of the Government of British Columbia regarding fish buyers and processors.

The spirit and intent of new policy directing the issuance of processing plant and fish buyers' licences is to promote competition and economic efficiency within the buying-processing sector . . .¹²

I believe that a clear set of regulations along these lines will go a long way towards clarifying governmental policy regarding the structural development of the fishery, and will provide fishermen with the assurance that new changes in policy will not result in greater concentration of corporate power in the industry.

Enforcement

The quota systems proposed in this chapter for the halibut, food and bait herring and abalone fisheries will present a significant departure from past regulatory practices and call for new enforcement techniques. The principal enforcement objective must be to ensure that holders do not exceed their quota privileges. This is essential, not only to ensure that the catch will be constrained to the sustainable capacity of the stocks, but also because a quota system will enjoy the confidence of participants only if all are assured that violators do not stand to profit from their excesses.

Quota holders will have incentives to land their full quotas over the course of the season in light of stock availability, market conditions and so on. Inevitably, individual

fishermen will exceed their quota entitlements inadvertently, due to time-lags in receiving data on landings, unexpectedly large catches late in the season, and so on. The enforcement provisions I recommend therefore are designed to make allowance for such contingencies, but to deal more harshly with offenders who abuse their privileges seriously:

1. Fishing for halibut, food and bait herring or abalone without the appropriate license should continue to be an offence under the Fisheries Act.
2. Where the holder of a quota privilege exceeds his quota in a season by 5 percent or less, the Minister should have the authority under the Regulations to levy a surcharge on the amount of the excess. The surcharge should be fixed at the average landed price for the species during the month in which the infraction occurs. In effect, the fisherman would recover none of his costs on that portion of his catch.
3. Where the holder of a quota privilege in a season exceeds his quota by more than 5 percent, the Minister should be authorized to levy the quota surcharge described above and to deduct the full amount of the excess from the quota holder's eligibility in the following season. For flagrant and repeat violations the Minister should be authorized to suspend the holder's right to exercise quota privileges in the fishery for the following season or to cancel it permanently.
4. The Minister should have the authority to cancel quota privileges where they are transferred to ineligible recipients as described earlier in this chapter.

These enforcement tools should be adequate to discourage abuses of fishing privileges. The more drastic suspension and cancellation procedures will be available for serious infractions, while the quota surcharge and deduction remedies should discourage abuse while leaving room for unintentional excesses.

Besides these special provisions for ensuring compliance with licensing and quota regulations, I recommend a more aggressive approach to enforcement generally. The Fisheries Act and Regulations provide an arsenal of enforcement remedies to the Department to deal with those who abuse fishing privileges by ignoring closed seasons or areas, by fishing with illegal gear, and so on. These measures include fines (of up to \$5,000), confiscation of vessels and gear, and suspension or cancellation of licenses. However, in the course of the Commission's public hearings it emerged that nearly all commercial fishermen favour a tougher enforcement policy. Hitherto, the Department has tended to rely on charges laid under the Act, sometimes in conjunction with the temporary seizure of a vessel or equipment. Fishermen point out that a much more effective deterrent would be suspension or cancellation of the violator's fishing license, which the Minister has power to do. I share the concerns expressed by others in this regard, and I recommend that the Minister actively exercise his authority to suspend licenses for limited periods and, in flagrant and repeat cases

of violation, to cancel the offender's commercial licenses permanently. (The general problem of enforcement policy is discussed briefly in Chapter 13.)

Appeals

Restrictions on the granting of fishing privileges call for some mechanism for appeal in cases where judgements must be made about an applicant's eligibility for obtaining a license or replacing a vessel. Also, because the withholding of a license has major consequences for an individual's livelihood, a variety of "special circumstances" can arise that deserve consideration. As a result, the Department has evolved a formal appeal system over recent years.

Where a fisherman or vesselowner applies for a license, transfer, replacement or some other matter relating to licensing and his application does not meet the licensing regulations, he is given a written rejection with the reasons for the denial. He may then pursue the matter by writing to the Vessel License Appeal Committee, explaining why he considers he should be exempted from the relevant provisions in the regulations. The Chairman of this Committee is a Departmental license appeals officer who devotes full time to this task and handles routine cases without further referral. Unusual or controversial cases are referred to the full Committee, consisting of the Chairman and two other public servants. The Committee reviews the decision made by the Licensing Section of the Department, considering any new information that may have become available and referring to precedents. If the Committee has any doubt about the appropriate decision, it denies the appeal and informs the applicant of his right to appeal to the Pacific Region License Appeal Board.

This Appeal Board is largely independent of the Department. All six members are appointed by the Minister; the one Department employee serves as Chairman and Secretary and does not vote on the Board's decisions. Four are retired fishermen with broad knowledge of commercial fishing, and the other is selected for his general knowledge of the fishing industry. The Board meets in Vancouver one or two days each month.

Applications for appeal to the License Appeal Board are submitted in writing, and applicants are encouraged to appear before the Board in person. After the appellant presents his case, the Board deliberates and sends its decision to the Minister with the details of the appeal. The Minister, finally, considers the case and the Board's recommendation. He may request more information from the Board, or ask it to reconsider its decision, but in most cases he accepts the recommendation and informs the appellant of his decision.

The grounds for appeal are set out in some detail in the Pacific Fishing Licensing Regulations; they refer to late applications for reasons beyond the control of the applicant, injury, industrial disputes and acts of God among other things. In 1980 the Appeal Board considered 147 appeals, about half of which were approved and half denied.

When a restricted licensing system is introduced in a new fishery, a temporary "special appeal committee" is struck to deal with the typically numerous applications from fishermen who fail to qualify but feel they are entitled to a license. These special committees are chaired by the Chairman of the Vessel License Appeal Committee, and they usually operate within well-established guidelines. Applicants who are denied their appeal by a special committee may apply further to the Appeal Board.

The basic structure of this appeal system appears to me to be excellent. Yet there is a degree of distrust and cynicism toward it among fishermen that undermines the integrity of the system. It appears to me that this is attributable to unnecessarily secretive aspects of the appeal process. The grounds on which appeals are made are never disclosed, nor is the Board's rationale for approving them, so even though an approval may be entirely appropriate, outsiders have no basis for assessing this. In the circumstances of the fisheries, where the granting of licenses affects not only those who receive them but also indirectly the welfare of all the other fishermen, who may be competing for the same catch, this arrangement is bound to cause discontent.

In order to improve the appeal arrangements and engender greater confidence in the process, I recommend that the presentation of appeals before the Appeal Board, and the basis of the Board's decisions, be made public. I hasten to add that I do not mean that the deliberation of cases among the members of the Board, or their individual votes, be disclosed; like the deliberations of a jury they should remain confidential to protect their impartiality. But, like court testimony and judicial decisions, the case put by the appellants and the grounds for the decisions should be open to public scrutiny.

I do not consider it necessary to make public the proceedings of the Departmental License Appeal Committee or "special appeal committees" struck for individual fisheries; these bodies resolve straightforward cases, referring the problematical ones to the Appeal Board. Nor do I intend that the Board's procedures should become highly formalized when they cease to become private; public access to the process and simple statements of reasons for decisions should do much to improve confidence in this important aspect of licensing policy.

FOOTNOTES

1. Exhibit #98, p.5.
2. Reforming Regulation, Economic Council of Canada. Ottawa, 1981. Chapter 7.
3. C.R.C., c. 824 and amendments thereto.
4. For an historical account of the development of the halibut fishery, see B.C. Cook and P. Copes, Rationalization of Canada's Pacific Halibut Fishery, Discussion Paper 81-12, Institute of Fisheries Analysis, Simon Fraser University. Burnaby, 1981; and The Public Regulation of the Commercial Fisheries. A Report to the Economic Council of Canada by the Economics Study Group at the University of British Columbia, 1980. (Publication pending.)
5. Revised Statutes of Canada 1970, c. F-17.
6. See B.E. Skud, Jurisdictional and administrative limitations affecting management of the halibut fishery, Ocean Development and International Law Journal (4). New York, 1977. p. 121-142.
7. International Pacific Halibut Commission, Annual Report. Seattle, various years.
8. Figures provided by the Department of Fisheries and Oceans.
9. Fernand J. Doucet and Peter H. Pearse, Fisheries Policy for the Pacific Coast: Issues and Advice. A report prepared for the Minister of Fisheries and Oceans. Vancouver, 1980. p. 42.
10. See Marvin Shaffer and Associates, Ltd., Charter Boat and Guide Survey - Preliminary Policy Report. Prepared under contract to Quantum Research, Ltd. for the Department of Fisheries and Oceans. Vancouver, 1981.
11. See W.D. Masse, Canadian Resident Charter Boat Licensing: A Background Paper, Department of Fisheries and Oceans. Vancouver, 1980.
12. Commercial Fisheries and Mariculture: A Policy for the 1980's. Ministry of Environment. Victoria, (undated).

CHAPTER 6

Rationalizing The Salmon And Roe-Herring Fisheries

"It is trite but true: 'too many boats chasing too few fish.'"

PACIFIC COAST SALMON SEINERS' ASSOCIATION¹

In the two preceding chapters I have described the urgent need for new policies to promote orderly development of the fishing fleets and to reverse the destructive trends toward excessive fishing capacity. The methods that can be adopted for this purpose have been outlined with their advantages and disadvantages; I have also discussed the features that should be incorporated into fishing privileges to facilitate fleet rationalization.

In Chapter 5, I recommended changes in the licensing arrangements for certain smaller fisheries that demand immediate attention. The proposed reforms are fundamental, but they are feasible in these fisheries and their advantageous effects are predictable. They should go a long way to overcome pressing problems, to enable better resource management, to eliminate incentives for redundant fleet expansion and to improve returns to fishermen and to the public.

Our two biggest fisheries, salmon and roe-herring, present much more difficult problems than those discussed so far. Thousands of vessels and individual license holders, and many more fishermen, tendermen and shoreworkers are directly dependent on these fisheries. There are many separate groups involved, with special problems and often conflicting interests. A long history has left the salmon industry, particularly, with deeply entrenched patterns of fishing and regulation, and many people have invested heavily and adapted their lives accordingly.

The salmon and roe-herring fisheries have much in common. Both produce high-value food products. Both are conspicuously unstable as a result of wide year-to-year fluctuations in the resource and in prices. Both experienced similar bursts of prosperity in the 1970's, which attracted a great deal of new but unproductive investment in fishing capacity and aggravated the subsequent decline. Fishing capacity is now grossly excessive in both fisheries. Regulation of both is complicated by the fact that more than one fleet operates on the same stocks and that, to a large extent, they are exploited by the same vessels. And, finally, the stocks on which both fisheries depend are particularly difficult to manage.

Because of these complications, the kind of reforms that I have recommended in Chapter 5 for certain other fisheries would be much more difficult to implement for salmon and roe-herring. At present, at least, any system of individual catch quotas would, in my judgement, be exceedingly difficult for the salmon and roe-herring industries to adjust to and probably beyond the capability of the Department to administer. But the presentations at the public hearings lead to the inescapable conclusion that fundamental changes are needed to reverse the current adverse trends. Present circumstances and trends are unsatisfactory to everyone — fishermen, vesselowners, processors, the regulatory authorities and other Canadians who watch a wealth in rich resources being dissipated in wasteful and destructive fishing effort.

If the value of the salmon catch has risen substantially over the last decade, why have the returns to fishing not risen accordingly? The answer underlies all the discussion and recommendations relating to the commercial fisheries in this report: the cost of fishing has increased, not just because labour and capital costs have risen everywhere, but also because the fishing fleet has expanded unproductively. The catch is now spread over a grossly oversized fleet, and must bear the cost of all the excess capacity. This is clearly a result of faulty regulatory policy.

Prudent investors would hardly invest nowadays without an expected pre-tax rate of return of 15 or 20 percent, and more for risky ventures. Yet investment in the salmon and herring fleets has burgeoned in recent years, earning much less than this and adding nothing to the fleets' production. The framework of regulatory policy that has encouraged, or at least permitted, this to happen will also allow any future gains from enhanced resources or higher prices to be dissipated in redundant fleet expansion.

The kind of changes in policy required to reverse the adverse trends in these fisheries will be difficult, controversial and costly. Those that I propose in this and the preceding chapter seem to me, on the basis of all the information and advice I have received, to afford the most effective and equitable means of redirecting the development of the salmon and roe-herring fisheries. The proposals will likely receive some support from within the industry, but that support will not be unanimous and there will be serious difficulties to overcome.

LICENSING IN THE SALMON AND ROE-HERRING FISHERIES

Some of the historical events that led up to the present policies for controlling fleet development were described in Chapter 4, and the present variety of licensing systems for fisheries on the Pacific coast were sketched in Chapter 5. The current structures of the salmon and roe-herring license systems, which were the earliest of the restrictive licenses introduced, are rather complicated, and can only be understood in light of their historical development. Many of the arrangements are Departmental practices rather than formal

regulations; they are not well documented and have often proven difficult to sort out.

Salmon Licenses

The pioneering scheme was the "Davis Plan" for the salmon fishery, which was announced in 1968 as

Measures to increase the earning power of British Columbia salmon fishermen and to permit more effective management of the salmon resource by controlling the entry of fishing vessels into the fishery . . .²

Background The evolution of this program, and of the fleet, since it was introduced are well documented and will be summarized briefly here.³

The first step was an attempt to freeze the fleet. All vessels that had recorded landings of 10 thousand pounds of pink or chum salmon or the equivalent in other salmon species in either of the two preceeding fishing seasons were declared eligible for "A" licenses (referred to here as "ordinary" salmon licenses). These licenses were applied to the vessel, they were transferable with the vessel, and the licensed vessel could be replaced. Vessels that had recorded salmon landings of less than the qualifying amount were awarded "B" licenses at a reduced fee; these vessels could not be replaced (and are therefore referred to here as "temporary" licenses). No new licenses were to be issued.

The scheme was highly controversial, and a number of concessions were made that had the effect of weakening the freeze on the fleet. The most important of these relaxed the requirement for landed salmon, and vessels that had landed any species equivalent in value to the 10 thousand pounds of pink or chum salmon (approximately \$1,250 worth of fish) were made eligible for ordinary salmon licenses. Thus many other vessels, including most of the halibut and trawl fleets, were added to the licensed salmon fleet. A few more licenses were awarded as a result of appeals.

Several special arrangements were made for Indians. In 1971, any Indian with an ordinary license could convert it to a new sub-category of Indian licenses ("A I" licenses) which carried lower fees but eliminated the opportunity to participate in the buy-back program introduced at that time. Until recently, these Indian licensed vessels could be transferred freely only between status Indians, but if the accumulated difference in fees between the ordinary and Indian licenses were paid, the licenses could be renewed as ordinary licenses and transferred to non-Indians. As the value of ordinary licenses rose over the years, many Indian licenses were transferred to non-Indians in this way. In an effort to prevent further decline in Indian participation in the commercial fisheries, conversions and sales of Indian licenses to non-Indians were prohibited in 1979.

The evolution of temporary licenses is complicated. In 1970 the Minister announced that all of these licenses would be renewable for only 10 years, then they would be eliminated. When that term expired on December 31, 1978 for

the original licensees (referred to as "original B's"), the 103 vessels remaining in this category were granted an extension of five years to 1983, providing that they continued to be operated by the original licensee, and that they landed salmon every year.

Native Indians with temporary licenses were permitted to convert them to Indian ("A I") licenses in 1973. A small number who acquired temporary licenses after 1973 were granted long-term extensions to their renewability, subject to annual review. There are now 14 of these "appeal B" licenses. Over the years, some holders of ordinary licenses chose to replace them with temporary licenses with a limited life of 10 years from the date of conversion. There are 64 of these "downgraded B" licenses.

In May, 1971 a buy-back program was initiated to eliminate some of the excess fleet. To provide the funds for this purpose, license fees for ordinary licenses were doubled. (Those for temporary and Indian licenses were not, on grounds that these vessels were not to participate in the buy-back plan.) The operation of this short-lived fleet reduction scheme is described below.

It soon became clear that limiting the number of vessels was not adequate to control expansion of fishing capacity, because licensed vessels were replaced by larger vessels - often several times larger - and capital continued to be invested in more efficient vessels and equipment. In an attempt to forestall this, replacement rules were adopted that restricted replacements to vessels of no greater length or tonnage than the vessel being retired ("foot-for-foot" and "ton-for-ton" replacement rules). Later, the freedom to combine licensed tonnage from two or more vessels into a single larger vessel ("pyramiding") was prohibited. Nonetheless, as the value of salmon rose, investment in vessels and equipment continued.

While the number of licensed vessels in the salmon fleet has declined since 1969 from more than 6100 licenses to 4165 ordinary, 378 Indian, and 286 temporary licenses in 1980 (as shown in Table 5-1), the capacity of the fleet has grown substantially; the capital invested is probably several times greater now than when the fleet control program was introduced, and because of technological advances, the fleet's catching power has increased even more.

Current licensing arrangements. Today, all salmon licenses are applied to vessels, and authorize the vessel to engage in salmon fishing. However, most of the temporary licenses prohibit replacement of the vessel, unless it is lost, and require that it be operated continuously by the owner originally licensed, so in effect they license a person as well. (The restrictions on the "Appeal B" licenses are rather unclear, insofar as the vessels are sometimes operated by another member of the Indian licensee's family.)

Salmon licenses are renewable annually provided that commercial landings of some fish are recorded at least every second year, (one fish is sufficient). The exception is the

"original B" licenses for which landings must be recorded every year. Temporary licenses can be renewed only for a limited period (though the ultimate life of "appeal B" licenses is unclear). An ordinary license can at any time be converted to a temporary license at the option of the licensee.

Several restrictions apply to the gear that may be used. In 1977 a moratorium on new seine vessels was imposed, although it has not been altogether effective. In 1981, a form of area licensing for troll vessels was introduced that required each licensee to elect to fish either inside or outside the Gulf of Georgia; those that choose the Gulf are restricted in their freedom to use other gear.

The annual fee, payable upon renewal of licenses, varies with license category as follows:

ordinary licenses	
vessels less than 30 feet.....	\$200
vessels greater than	
30 feet but not less than 15 tons	\$400
vessels greater than 15 tons.....	\$800
Indian licenses.....	\$ 20
temporary licenses	\$ 20

Ordinary licenses are transferred automatically with the vessel; other transfers can be made only with the consent of the Minister. Indian licenses are now transferable only among status Indians. "Downgraded B" licences are transferable but other temporary licenses are not.

Replacement provisions are as follows. Ordinary and Indian licensed vessels may be replaced upon the prior approval of the Director General (or, by appeal, of the Minister), subject to "foot-for-foot" and "ton-for-ton" replacement restrictions. That is, a replacement vessel must not exceed the vessel replaced in terms of either length or tonnage. However, only vessels greater than 15 tons must be individually rated with respect to their tonnage, under ship's registry requirements of the Department of Transport, and this excludes more than 85 percent of all salmon vessels. A new seine vessel can be introduced only if another seine vessel is retired.

Despite the Department's efforts to tighten the rules since vessel replacements were first restricted, a number of serious problems remain. The most fundamental of these calls into question the adequacy of using hold capacity and length as reliable measures of the fishing power of vessels. A comprehensive measure of fishing capacity would include a host of other contributing factors, such as engine power, hull design, electronic apparatus and power devices for deploying gear. But, as I explained in Chapter 4, simultaneous restrictions on all the dimensions of fishing power would be virtually impossible to administer and enforce.

Even the present "ton-for-ton" and "foot-for-foot" replacement rules which apply to only a couple of the dimensions of fishing capacity, are difficult to enforce. First, vessels with a capacity of less than 15 tons are not required

to be surveyed or registered, so the Department can only apply the "foot-for-foot" restriction.

Second, where an unregistered vessel is replaced by a registered vessel, the Department relies on a length-to-tonnage conversion table. Because the length of a vessel is only one factor among many that determine its tonnage, the relationships in this table are somewhat arbitrary.

Third, even for a registered vessel, net tonnage is an unreliable indicator of its hold capacity, since it measures not only hold capacity but other elements of interior vessel space as well. Marine architects can design a vessel to meet tonnage constraints while increasing hold capacity. Furthermore, classifying space in the hold inevitably involves subjective judgements. Thus, a replacement vessel can, in fact, have a greater hold capacity than that of the replaced vessel even though their surveyed net tonnages are the same. These weaknesses in the limitation of fishing capacity of vessels are among the most serious deficiencies of the salmon fleet control policy.

Roe-herring Licenses

The roe-herring industry began in 1972 after herring stocks had partially recovered from a collapse in the 1960's and the Japanese market for roe became accessible to Canadian producers. The mature fish are harvested in the spring by seine and gillnet vessels when the roe is ripe and the fish are about to spawn.

This new, lucrative fishery developed with startling rapidity, attracting large numbers of vessels, and in 1974 the government attempted to control the fleet's expansion by restricting the fishery to those who obtained licenses in that year. Anyone could obtain a license, but to discourage applicants an unprecedented annual fee of \$2,000 was levied for a seine license and \$200 for a gillnet license, though Indian licenses in both categories were issued for \$10. The Department's goal was to issue 150 seine and 450 gillnet licenses, but this was greatly exceeded: 270 seine and 1,400 gillnet licenses were issued, far in excess of the capacity required to harvest the available catch.

The roe-herring ("H") license, in contrast to the salmon license, is issued to persons rather than vessels. The licensee must designate the vessel to be used but the designated vessel can be changed. The Department, by administrative practice, requires that the licensee have an ownership interest in the designated vessel to the extent of one-third interest in a gillnet skiff and 25 percent in a seine vessel. But Indian licensees cannot exercise their licenses on boats not owned or operated by Indians. The license must be exercised by the licensee (or if it is held by a company, by the "designated" operator), and it is technically non-transferable. These licenses must be renewed every year by January 15th, but fish do not have to be landed to qualify for license renewal. In 1980, as Table 5-1 indicates, there were 1310 gillnet and 248 seine licenses issued.

The roe-herring licensing system has given rise to several serious problems. The first and most obvious is that it failed

to curtail the size of the fleet to the needed capacity. This was due partly to generous initial eligibility criteria; partly to the fact that Indian licenses continued to be issued without restriction on numbers until 1977, and partly to the fact that in 1974, when restrictions were introduced, those who had previously engaged in roe-herring fishing could obtain a second license, and nearly all did so. Furthermore, only those licenses issued in 1974 to first-time participants were subject to the requirement that they be exercised by the licensee; licenses issued in respect of previous participation were not. Because of the difficulty of enforcing two sets of regulations, this licensee-operator rule was abandoned in 1979.

The original intent of making licenses non-transferable, and requiring that licenses be exercised by the holders on vessels in which they have ownership interest, was to reduce the number of license holders as they retired or died. However, the Department found that prohibiting transfers to a deceased licensee's spouse or next of kin was difficult, so the non-transferability rule has been relaxed in these cases. And, as these fishing privileges have become more valuable, ways of legally circumventing the non-transferability rule have been found by way of leases and trust holdings of the vessels of licensees. Thus the licenses are effectively transferable, though at some inconvenience and cost.

Furthermore, because the licenses apply to persons, who can change their designated vessels, there is little to restrain the growth in fishing power of the vessels used and hence the expansion of the fleet's fishing capacity. In this respect the licensing system is even less effective than the salmon vessel licensing system. Thus the roe-herring license system has proven to be incapable of controlling the capacity of the fleet, which should be its main purpose.

The roe-herring fishery is extraordinarily hectic, due to the unpredictability of the stocks and available catch, the massive and excessive fishing power of the fleet, the necessity of limiting the fishing time to the moment when the fish are about to spawn, and the high values at stake. It is probably the most difficult of fisheries to manage; fisheries officers under extreme pressure and great uncertainty have had to try to restrict openings to a few minutes in many cases, during which fortunes have sometimes been made.

Success in regulating the catch has been mixed at best. Harvesting targets have been exceeded in many cases, and in others the fisheries officers have been reluctant to declare openings where the fishing power of the fleet is so great it would threaten to decimate the stocks. And the Department's attempt to divide the catch between the seine and gillnet sectors in prescribed proportions has failed to even approximate the targets.

There has been a great deal of discussion, which extended into this Commission's hearings, about possible ways of making the fleet more manageable. Last year, for the gillnet fleet, where excess capacity is most extreme, the permitted length of nets was halved. This year, the Department

attempted to alleviate excessive concentrations of fishing power by spreading the fleet geographically; it did this by dividing the coast into three areas and requiring each licensee to choose one and to confine his fishing to the chosen area. The Department and a majority of fishermen agree that this made the fishery somewhat more manageable, enabled improvements in stock utilization and lowered the fleet's operating costs, although it did nothing to reduce the fleet's overall excess capacity.

The roe-herring fishery has had a significant impact on the development of the salmon fleet. Seine vessels that fish roe-herring typically fish salmon as well, and high earnings in roe-herring during the 1970's fueled investment in vessels used in both fisheries. In the herring fishery, hold capacity is a much more important constraint on the fishing capacity of a vessel, and this has stimulated the introduction of larger vessels used in the salmon fishery as well.

Proposed Changes in Licensing

In this preliminary report, I recommend certain modifications to licensing systems for the salmon and roe-herring fisheries, most of which have been considered for some time. My recommendations are designed to continue and strengthen the current restrictions on expansion of the fleets in these fisheries, to supplement them with certain refinements that will facilitate management of the stocks, and to eliminate some regulations that are unnecessary for the proper management of these fisheries.

Among other things, my recommendations are aimed at bringing the salmon and roe-herring licensing systems into line, combining the best features of each. I see no justification for the existing divergent provisions for these two fisheries in view of the similar problems they pose for fleet management and the fact that many vessels participate in both.

Appurtenancy of licenses For reasons explained earlier, the most appropriate means for controlling expansion of fishing capacity in the salmon and roe-herring fisheries, for the time being at least, is by limiting the number and size of vessels. This calls for licenses that apply to vessels to control their number and size and to regulate their replacement. But in all cases there must be a licensee, a person or company who can be identified as the holder of the license, to whom notices can be sent and who can be held responsible for paying the fees and exercising the fishing privileges in accordance with the fishing regulations. In addition, the Department will require records of the identity of licensees in order to administer transfers and to enforce limits on the concentration of fishing rights and control by processing companies as recommended in Chapter 5.

Neither of the present systems meet these requirements: the salmon license puts restrictions on vessels, but it is not issued to a person; the roe-herring license is issued to a person, but it does not put restrictions on vessels. Accordingly, I make the following recommendations:

1. The existing ordinary, Indian and temporary salmon licenses should be retained, but in all cases the registered or licensed owner of each vessel should be designated as the licensee, and the license should authorize the use of that vessel in the salmon fishery. This will enable the Department to enforce the limits on holdings of fishing privileges and on transfers, recommended in the preceding chapter.
2. The existing personal licenses for the roe-herring fishery should be retained, but the vessel designated by each licensee should become the appurtenant vessel for his license, subject to the same transfer and replacement rules as are to apply in the salmon fishery.
3. The existing troublesome requirement that the licensee physically operate the vessel, or be present on it while it is being used, should be abolished.

Gear licensing Currently, roe-herring licenses specify either seine or gillnet gear to be employed by the licensee. In the salmon fishery, only seine gear has been so restricted; the "moratorium" invoked in 1977 attempted to prohibit any additional seine gear from entering the fishery, but ways have been found to circumvent this restriction. Apart from this, and the restrictions on other gear applied to Gulf trollers referred to earlier, vessels with salmon licenses have been free to use troll, gillnet or seine gear or any combination of these. Control over the addition of new types of gear on vessels and the switching from one gear type to another is essential in order to limit the capacity of the fleet. To this end, I make the following recommendations:

1. The present seine and gillnet gear specifications in roe-herring licenses should be retained.
2. Comprehensive gear licensing should be introduced to supplement the existing salmon licensing system. To accomplish this, I propose that the following steps be taken:
 - a) Beginning in 1982, all salmon licenses should specify the gear to be used by the licensee in the salmon fishery.
 - b) Where the vessel has landed more than 90 percent of its salmon catch, by weight, using one gear type during both 1980 and 1981, the license should specify that gear henceforth.
 - c) Licenses that apply to combination vessels that have landed more than 10 percent of their salmon catch with both gillnet and troll gear in either 1980 or 1981, should authorize the use of either or both of these gear types.
 - d) Subject to the vessel replacement rules, licensees should not be restricted in acquiring from other licensees the privilege to use another type of gear on their vessels. This will provide an opportunity to combine vessels (which may well be efficient units in certain circumstances) while reducing the aggregate number of vessels and thereby promoting fleet rationalization.

However, anyone who receives a license for more than one gear, either at the inception of gear licensing or later through an acquisition, should not be permitted to "split" them by transferring the right to use one of the gears while retaining the other; that would give the initial combination licensees an unreasonable advantage and permit more vessels to enter the fishery. This implies that combination licenses must be maintained as such.

Gear allocation At this stage I refrain from recommending additional measures in the form of "gear allocation," or formal prescription of the share of the catch to be allocated to each sector of the salmon or roe-herring fleets. The Department and industry representatives have discussed such arrangements for some time, and I am aware that some people support gear licensing for salmon only on the condition that the catch allocation be prescribed. But, in my opinion, they underestimate the difficulty of apportioning the salmon catch among the gear sectors according to prescribed targets. Experience in the roe-herring fishery has demonstrated the Department's inability to meet such targets where there is only one species and two sectors of the fleet. For the salmon fishery, with three gear sectors, a large number of combination vessels, and five major species of fish all of differing values and susceptibilities to particular gear, the problems would be magnified considerably. I am therefore not prepared to recommend here a policy that might well be unfeasible to implement effectively and which could aggravate friction between the industry and the Department.

Actually, the Department has, in effect, been allocating the catch among sectors of the fleet for many years, though not according to a declared formula. Allocation is an inevitable consequence of regulations relating to the fishing times, areas and gear applied to the various sectors of the fleet. I intend to re-examine the issue of catch allocation in my final report; here I propose only that the Department attempt to maintain roughly the allocations that have been achieved in recent years, leaving open opportunities for change in the light of fleet rationalization resulting from measures recommended in the remainder of this chapter.

Area licensing The three-area licensing system for the roe-herring fishery, introduced as an experiment last spring, should be continued next year. This innovation facilitates on-line management of the fleet and, by reducing the threat of excessive fishing power being brought to bear on particular stocks, enables better resource utilization. Moreover, it reduces the fuel and other costs that are otherwise associated with the whole fleet ranging over the entire coast.

However, the current rule that any roe-herring licensee may hold only one area license should be removed. This will permit a roe-herring licensee to acquire from another licensee, subject to the replacement rules recommended below, the privilege to fish in another area. By this means herring fishermen can broaden their fishing opportunities, reducing the risk associated with area licensing and, in the process, reduce the number of vessels in the licensed fleet.

I am not prepared to recommend in this report that area licensing be incorporated into the salmon fishery beyond the present two-area arrangement for troll fishing. The salmon fishery has, for the most part, become adapted to unrestricted mobility over the coast, and vesselowners have invested heavily in engine power and vessel design suitable for this kind of operation. Nevertheless, the whole of the coast, including the Straits of Georgia and Juan de Fuca, the Queen Charlottes and the West Coast of Vancouver Island, is probably too large to regulate as a single unit, and it is treated as such only because of an accident of political history.

Some of the same benefits of area licensing in the roe-herring fishery would likely be realized in the salmon fishery, and in my final report I intend to reconsider the feasibility and desirability of area licensing for salmon. I shall also review, among other things, the three-area system applied to roe-herring, and possible changes to the number of areas and other modifications. As well, I intend to consider suggestions for designating "special reserve" areas for roe-herring, where a few vessels might be granted the right to fish for small stocks that cannot be opened to a large fleet in return for foregoing their broader fishing privileges.

Transfers As is now the practice in the salmon fishery, licenses for both the salmon and roe-herring fisheries should be freely transferable with the appurtenant vessel, subject only to the general restrictions recommended in Chapter 5. Thus transfers of these licenses to fish processing firms or to any licensee who holds 5 percent of the licenses in the relevant fishery should be prohibited.

Vessel replacement A program of fleet reduction will have a lasting effect only if the remaining fleet can be prevented from expanding its capacity. As already explained, under the restrictive licensing of the salmon fleet the number of vessels has declined, but the remaining vessels are larger, more powerful, more expensive and much more efficient in terms of catching capacity. In effect, much of the projected benefit from license limitation and buy-back activities have been dissipated through vessel replacement. So, the question is, what restrictions should be put on vessel replacement?

For reasons explained earlier in this chapter, the existing restrictions on replacement are seriously deficient as means of preventing expansions of fishing capacity. Improvements are essential in order to realize the full benefits of any reduction in vessel numbers, but there is no fully satisfactory alternative.

If the replacement of vessels were prohibited altogether, licensees whose vessels were accidentally lost would lose their fishing privileges as well; their licenses would "go down with the ship" unless some special replacement provisions were made. But if that were done, sinkings would offer an avenue for circumventing the prohibition. Furthermore, it would lead to unsafe conditions on older vessels; their owners would be reluctant to retire them from the fishery because that would terminate their fishing privileges. Finally, it would give rise to difficult problems of interpreta-

tion in borderline situations, where a licensee stops short of replacing his vessel but re-builds it instead. Here, any attempt to distinguish "replacement" with any degree of precision inevitably would be arbitrary and would involve awkward judgments in individual cases. Other possibilities lie in changing the restricted dimensions of length and registered tonnage to other, less elastic or more meaningful, proxies for vessel capacity, but none appear to offer clear advantages in controlling capital investment in fishing power over those applied today.

Government policy should be aimed at countering the natural tendency of licensees to replace destroyed or obsolete vessels with vessels that utilize more advanced fishing technology, engine performance and other features of a vessel's design that increase its capability in the fishery.

As an interim measure, I recommend that the replacement rules now in effect for the salmon vessels be continued, and that the same rules be applied to roe-herring vessels, but with the following modifications for both fisheries:

1. A vessel should only be permitted to be replaced by a vessel that has not more than 80 percent of the net registered tonnage and 80 percent of the length of the vessel replaced, and the length-to-tonnage conversion table should continue to be applied where appropriate.
2. Licensees should not be permitted to combine the licenses of two or more vessels into a single replacement. The prohibition against "pyramiding" now in effect in the salmon fishery should be retained and applied to the roe-herring fishery as well.

These interim proposals should sharply reduce incentives to replace vessels in both fisheries, but should allow adequate opportunities for replacement where required. The fractional replacement rules should offset tendencies for new replacement vessels to have greater fishing power than those they replace.

The above proposals for changes in salmon and roe-herring licensing are less fundamental than those I recommend for other fisheries in the preceding chapter. But I do not mean to imply that I have confidence in the present system of restrictive licensing in these two major fisheries as a means of controlling investment and expansion in fleet capacity in the long run. It has failed in the past, and for reasons I have discussed in Chapter 4, this approach cannot be expected to succeed in the long run even with supplementary restrictions. Moreover, I cannot agree with the view that the worst is over, now that some of the early loopholes in the system have worked themselves out and the boom of the 1970's is past. There is every reason to believe that the next rise in prices or increased catches will trigger new investment, and the vintage and structure of the fleet leaves a great deal of scope to increase capacity even within the proposed additional restrictions on vessel replacements. The measures I recommend should be viewed as a first step; a step which, combined with the other measures I recommend in this chapter, will provide some breathing space and create conditions for more fundamental reforms later.

These and other measures recommended in this report are designed to stop the treadmill of fleet expansion and to introduce some flexibility for further changes in the salmon and roe-herring fisheries. The removal of subsidies for vessel construction, recommended below, will dampen considerably the incentives to build new boats. The proposed royalties, and the prospect of increases in their rates, will help to moderate expected returns on new investment in fishing power. The need to reduce the catch of certain stocks, for conservation purposes, will have a similar impact. The combined effect of all these changes, coupled with the current economic circumstances in these fisheries, should be sufficient to constrain new vessel construction and replacement for the time being. I will consider further changes in my final report.

SUBSIDIES

Of all the needed changes, the most obvious is the removal of subsidies that encourage construction of fishing vessels. It is incongruous for government to provide financial incentives to build new fishing vessels when the overriding problem is one of too much fishing power, particularly when they are maintained in the face of general disapproval from the fishing industry, at least on the Pacific coast. Last year, as in previous years, the government was advised to eliminate "perverse subsidies" to vessel construction and the overwhelming weight of opinion expressed at my public hearings was consistent with that position.⁴

The general policy position of the Department is that no subsidies will be paid to support construction of vessels to be used in the Pacific fisheries. This is an improvement over previous policies which subsidized vessels heavily; however, it is contradicted by other departments of the federal government.

The most important of these direct and indirect subsidies are the following:

1. The Department of Industry, Trade and Commerce provides a subsidy to Canadian shipyards of 9 percent of the approved cost of constructing or converting vessels greater than 75 feet in length. Reports for the latest fiscal year, 1980-81, reveal that 18 agreements provided subsidies for 23 vessels, and a total subsidy to shipyards on the Pacific coast of \$15.7 million.⁵

At the time of writing, I have not been able to determine from the Department of Industry, Trade and Commerce how many of these subsidized vessels are fishing vessels. But apparently some of them are, contrary to the general policy of the Department of Fisheries and Oceans.

2. Revenue Canada, under the Income Tax Act (s. 127), permits 7 to 9 percent of the cost of designated equipment on new fishing vessels to be deducted from the tax otherwise payable by the owner in the year of acquisition. This is a deduction from tax payable, not from taxable income, so it is much more valuable to a taxpayer than a standard deduction of the same amount.

3. Ordinarily, the Income Tax Act allows fishing vessels to be depreciated at the rate of 15 percent, but new vessels can be depreciated at an accelerated rate of 33½ percent. This rate can be claimed on a "straight-line" basis so that this full fraction of the original cost can be deducted each year. The result of this is to shelter from tax an amount of income equal to the full cost of a new vessel in as little as three years.

This is undoubtedly the most powerful incentive to purchase or build new vessels at present. For example, a \$600 thousand vessel that yields an annual profit of \$10 thousand or 1.6 percent return on investment before taxes, can yield an owner in a 50 percent tax bracket (usually as a result of high income from sources other than fishing) a 20 percent return after tax. These arrangements encourage fishermen (and others, especially those with high taxable incomes) to invest in new vessels to shelter incomes from tax. Moreover, capital gains taxes and provisions to recapture depreciation discourage sales or withdrawal of depreciated vessels.

4. The Department of Fisheries and Oceans guarantees Fisheries Improvement Loans of up to \$150 thousand from banks to fishermen for the purchase, construction or improvement of vessels. The subsidy element in these loans is mainly in the favourable interest rate of 1 percent above prime. In the fiscal year 1979-80, 551 loans were extended under this program to vesselowners on the Pacific Coast, of which 334, amounting in total to \$18.4 million, were for the purchase or construction of vessels.⁶
5. The Federal Business Development Bank has a program of loans to provide fishermen with capital for purchasing boats and equipment as well as working capital. As of June 1981, there were 107 loans outstanding to the fishing industry, amounting to \$4.5 million, of which \$1.5 million was authorized during the last fiscal year.⁷

In addition to these subsidies, there are special assistance programs for Indians (described in the next chapter) and a wide variety of other federal and provincial support programs directed toward manpower training, processing, technology development and insurance. These programs are beyond the scope of this chapter, which is concerned with programs that stimulate irrational fleet expansion rather than those that have a well-defined and defensible social purpose (such as those directed toward Indians). The worst of these are the accelerated depreciation allowance, the investment tax credit and the shipyard subsidy applied to fishing vessels. I therefore recommend that these programs, insofar as they apply to fishing vessels used on the Pacific coast, be terminated forthwith.

ROYALTIES ON THE CATCH

For too long now the revenues from salmon and herring have been pumped into wasteful expansion of capacity to exploit the resource. It is now time to direct some of this revenue for the opposite purpose, to reduce the fleet and to enhance the resource.

In recent years there have been recurrent discussions and recommendations regarding levies on the catch as a means of generating revenue from the fisheries. The Minister's Advisory Committee on salmon fleet development advised in 1973 that

... since a license fee based on vessel tonnage does not adequately reflect catching ability or the use of the resource, the Committee recommends that required revenues for fleet rationalization be raised primarily through payments based on actual landings.⁸

A landings fee has also been considered as a means of recovering the cost of the Salmonid Enhancement Program. Such levies have already been introduced in the neighbouring fisheries of Washington State and Alaska. In 1978 a special advisor to the Department of Fisheries and Oceans recommended a royalty for the Pacific fisheries to discourage further investment in fishing capacity.⁹ In April 1980, in the Speech from the Throne, the government pledged itself to new revenue arrangements for the fisheries. And late last year, following new advice to levy royalties on salmon landings, the Minister announced his intention to do so in 1982 if circumstances were suitable.

The feasibility of levying a royalty on the catch, and the need to do so, has now been widely debated and studied, and I have received a great deal of helpful commentary on this question in the public hearings and meetings. Some oppose royalties on grounds that public revenues are raised through the tax system. But the tax system is a general method of exacting a contribution to the costs of government from all personal and business income, irrespective of any raw material used to produce it. Here we are concerned with returning to the public a share of the value of public resources used by private parties. So a royalty is not really a tax but a charge for using public natural resources. Such charges are customary in Canada for timber, furs, minerals, oil and gas, and there is no obvious reason to exempt highly valuable fish. Others oppose royalties on the grounds that they could not afford to pay them. But ability to pay varies widely, and a royalty is undoubtedly the best means of relating payments to gross earnings. Still others doubt whether such a system can be administered, which is a problem I address below. But notwithstanding such objections, many fishermen, vesselowners and processors accept the need to raise revenue from the fisheries and recognize that a royalty on landings affords the most appropriate means.

Whatever the difficulties, a levy on landings is clearly the most direct means of charging for the use of fish resources. It is also the most equitable method and has the incidental effect of dampening incentives to invest in additional fishing capacity. Having studied the alternatives and associated problems, I have concluded that a simple but significant royalty on landings of salmon and herring should be introduced without further delay.

It must be levied in as simple a manner as is consistent with equity in order to minimize problems associated

with implementation, administration and enforcement. Specifically, I recommend that:

1. Royalties should be applied to all landings of salmon and roe-herring beginning in 1982.
2. The charges should be collected from those who buy fish from fishermen.
3. Initially, the rates of royalty should be as follows:

chinook, coho, and sockeye	10¢ per pound
pink and chum salmon and steelhead	5¢ per pound
roe-herring	\$50 per ton

A simple fraction of the landed weight should be added for dressed fish to approximate the round weight equivalent.

4. Any licensee should be paid a rebate on the royalties paid on his landings if
 - a) he agrees to have his ordinary salmon license re-issued as a temporary ("B") license, which will expire in 10 years. A corresponding temporary roe-herring license should be created for this purpose; or
 - b) he provides the Pacific Fishing Fleet Development Corporation with an option to purchase his license (as described below).

These exemptions should be available independently to licensees with salmon and roe-herring licenses. They will afford an alternative to marginal fishing enterprises and at the same time advance the objective of fleet reduction.

The proposed royalty rates have been expressed in dollars rather than as a percentage of the landed value as recommended by some; the reasons for this should be explained. One is simplicity. Another is consistency and enforceability; the price of fish varies during the season and is sometimes embodied in post-season bonus payments and other considerations which do not provide a consistent base for a percentage levy. Specific rates eliminate opportunities to evade the charges through such arrangements. But most importantly, it ensures that the charge for a particular category of fish is the same for everyone. A fisherman who dresses his fish and handles them well, often receives a considerably higher price than others landing the same kind of fish. A royalty in the form of a percentage of the landed value would therefore discriminate against the former, who obtains the highest value for his fish.

The proposed 10¢ royalty rate will apply to fish that ranged in landed price from 90¢ to more than \$2.00 per pound in 1980, averaging about \$1.58 including bonus payments. The lower-valued pink salmon, to which the 5¢ rate applies, averaged 62¢ in the round and 88¢ dressed; chums brought \$1.22 to \$1.41 per pound, but significantly less in 1981 because few were of high quality ("silver-bright"). Steelhead are relatively insignificant in the commercial catch, but their prices ranged between those for pinks and chums. This year, the price of roe-herring caught by seine gear ranged upwards from \$560 per ton, and gillnet-caught

fish brought \$760 to \$1,000 per ton. These rates, applied to the catch in 1980 (a year of relatively poor runs) would have yielded some \$8 million in revenue from salmon. The proposed levy on herring, applied to the 1981 roe-herring harvest, would yield \$1.6 million.

The indicated rates are proposed for 1982 only. The long-term intention should be to raise them as conditions permit, and I shall review this issue again in my final report.

The revenues from this royalty system should be directed to the urgent needs of resource enhancement and fleet reduction. The rates proposed are higher, and the expected revenues greater, than under most previous proposals. This is because I see a need to go beyond modest suggestions for salmonid enhancement cost recovery to raise revenue to help to secure the buy-back program proposed below. In my final report I intend to deal more specifically with the allocation of funds to these purposes. The immediate need is to introduce a revenue system that will make those decisions meaningful.

Of all the changes I propose in this and the preceding chapter, only the introduction of royalties would significantly add to the administrative burden of the Department, but they would also produce the most revenue. The main new requirement would be more accurate statistical information on landings than is now available from fish sales slips. Certain changes to the Fisheries Act would also be required to supplement the existing provisions for reporting landings; I understand that these are already formulated.

The Government of British Columbia has taken steps to strengthen its regulatory control and information on related matters.

Development of an improved Licensing, Administration, Inspection and Enforcement capability, coupled with a new policy analysis and development role for the Marine Resources Branch, will provide for an effective monitoring role and the ability to influence federal policy direction.¹⁰

Statistical reporting systems for purposes of royalty administration should therefore be developed in close liaison with the provincial authorities.

In normal circumstances the opportunities for evasion will be minimized by the fact that royalties will be based on landings receipts, a copy of which is provided to each fisherman and forms the basis of payment for his catch. In some cases, however, commercial fishermen sell fish directly to consumers or restaurants, and this should be provided for. The legislative amendments should make the fisherman responsible for remitting the royalties in such cases. This is consistent with the Province of British Columbia's intent that "... fishermen who sell directly to the consumer will be required to have a buyer's license and to accurately record and report all sales."¹¹

The proposals in this and the preceding chapter cannot be implemented properly unless the government makes adequate budgetary and manpower provisions to carry them out. I therefore emphasize that these recommendations are conditional upon the Department being given the wherewithal to implement them properly. I do not attempt to say what these provisions would be, but I am assured that the Department has already estimated its needs for implementing a royalty system.

A BUY-BACK PROGRAM

Vessel licensing and replacement arrangements will regulate the growth and structure of commercial fishing fleets, and a royalty on the catch will reduce incentives to expand. But to improve economic conditions, additional measures are required to reduce the grossly overexpanded salmon and herring fleets. In effect, we need strong measures to undo the legacy of past policies that have allowed these fleets to expand far beyond the size that could efficiently harvest the catches. As explained earlier, reducing excess fishing capacity would not only permit the industry to achieve a higher level of economic performance but would also leave the fleet much more manageable so that stocks could be better utilized.

Past Experience

When the salmon fleet control program was introduced in 1969, restrictive licensing was intended to control further expansion of the fleet. Subsequently, the "buy-back" scheme was introduced in 1971 to reduce the fleet by purchasing and retiring vessels with ordinary licenses. Funds were to be provided by license fees, which were increased specifically for this purpose.

A special Buy-Back Committee, consisting of Departmental personnel and industry representatives, was struck to carry out the buy-back operations. During the ensuing three years, 362 vessels were purchased, stripped of their licenses, and resold at auction under a covenant which prohibited them from engaging further in commercial fishing on Canada's Pacific coast. Some \$6 million was spent on acquiring vessels during this period; of this, \$3.4 million came from license revenues and \$2.6 million from resale of vessels at auction.

These initial buy-back operations were suspended in 1974. Between 1972 and 1974, the market value of salmon licenses increased dramatically from about \$250 per licensed ton to roughly \$7,000. Although it was argued that buy-back purchases were driving up these prices, the main cause was the bumper harvests and record prices for salmon and roe-herring, which produced unprecedented incomes and over-optimistic expectations. At the same time, the funds generated from license fees remained unchanged, so that the rise in license values severely diluted the purchasing power of the revenues.

After buy-back operations were suspended in 1974 no more vessels were purchased for seven years, though the

increased license fees continued to be levied. Then, early this year, following new recommendations to the Minister, the program was reactivated. The proposal called for funding through a grant of \$10 million (roughly equivalent to the accumulated fees intended for this purpose, plus interest) and through a further increase in license fees. In the end, only \$2.9 million was allocated for this purpose and its expenditure was limited to the remainder of the 1980-81 fiscal year.

With these meagre funds, and only six weeks to expend them, the Department endeavoured to discourage frivolous applications for sales of boats by requiring a \$100 application fee from any owner who sought an offer for his vessel. Nevertheless, some 350 applications were received - far more than could be purchased or even appraised in the time available. By the end of the fiscal year, 26 vessels were purchased at a cost of \$2.5 million, and at the time of writing the vessels are yet to be re-sold. Since then, buy-back operations have again been suspended, apparently pending this report.

Current Attitudes and Opportunities

In the course of the public hearings and my meetings with commercial fishermen, mixed opinions were expressed about the effectiveness of a renewed buy-back program. Many were critical of the previous programs, usually on the grounds that the vessels purchased were usually small, old and decrepit, and had accounted for only a very small portion of the catch. Hence, their removal from the fleet did not significantly improve the performance of the remaining vessels. My investigations indicate that this criticism is unjustified: the vessels purchased in each gear class had recorded very close to average landings in that class. In any event, the concern seems to reflect some misunderstanding. The main point is that the licenses were eliminated; they could (and almost certainly would by now) have been transferred to new vessels with much greater fishing power. Indeed, purchases of older and less costly vessels may be desirable insofar as this enables removal of more licensed tonnage for the money expended.

Support for buy-back programs was usually qualified. Some advocated purchases of only one gear type, usually seiners. Others objected in principle to any scheme that would use public funds to "bail out" fishermen for having overinvested or to reimburse private parties for privileges issued by the Crown. Nevertheless, the weight of opinion on this question is that a buy-back program would be advantageous, and in my opinion, it is probably the only feasible means at present for dealing with the serious problem of overcapacity in our salmon and roe-herring fleets.

In view of all the testimony on this matter, I have concluded that a renewed buy-back program must meet certain conditions. First, in order to be worthwhile, the buy-back effort would have to be much more substantial than past efforts. The value of modern vessels and fishing licenses is now recognized as being so high that many millions of dollars would be required to remove a significant amount of

excess capacity in order to improve the earning power of the remaining vessels and the operational management of the fleets. Second, fishermen and vesselowners must participate in, and have an influence on, the buy-back operation, especially if funds for the program are to be raised from landings. Third, those who can expect to benefit from fleet reduction should bear at least a substantial share of the cost, but they must be assured that the funds contributed will be used for the intended purpose. Fourth, the buy-back operation must have financial integrity; i.e. it must have its own sources of funds and the ability to recycle revenues from sales, and it should be financially accountable. It must also have the means of minimizing upward pressure on the value of licenses as the buy-back program proceeds. Finally, the buy-back scheme must be buttressed with much more rigorous rules and administration of the licensing arrangements to close loopholes, to reduce discretionary issuance of new licenses and to tighten control of vessel replacement, which otherwise threaten to frustrate any attempt at fleet reduction.

If these conditions can be met, fleet reduction would produce substantial benefits. It would facilitate increased escapements and would leave the fleet more manageable so that the stocks could be better utilized. Both results would improve catches in the long run. In addition, average catches would increase as vessel numbers were reduced, and, since the cost of operating the remaining fleet would not increase significantly, the increased catches would be largely net gains. Finally, with the fleet reduced, existing restrictions on gear, fishing time and fishing technology could be relaxed, thus improving the cost-efficiency of fishing.

Calculations under a variety of reasonable assumptions indicate that the financial benefits to be gained by retiring part of the salmon and roe-herring fleets exceed the costs by a wide margin. If these gains are effectively captured and channeled into the buy-back program, it can be financed by the industry without leaving fishermen and vesselowners financially worse off in the long run.

Informed observers have estimated the current market value of the salmon fleet, including licenses, at up to \$800 million, through this figure is probably too high. The more excess fleet capacity removed the greater the net economic gains, of course, but what fraction of the present fleet is "excess" is debatable. Some observers have suggested that at least 40 percent of the existing capacity could be beneficially removed; others have suggested 50 percent; and others, an even larger fraction. Given the available information, no one can reliably specify the optimal fleet size (indeed, in the long run the best fishing system may well include land-based wiers for certain salmon stocks). Nor can its structure be specified. Eight years ago a Minister's advisory committee recommended that

The Fisheries and Marine Service should undertake, as a matter of urgency, an assessment of the relative potential economic efficiencies of the

three major gear types, and of combination units. Reliable information of this type is not now available, and is urgently needed for the guidance of the "Buy-Back" Committee.¹²

But, these assessments have still not been made. There can be no doubt though that the optimal fleet is a great deal smaller than the existing fleet, and that even a substantial reduction would leave the fleet capable of harvesting the available stocks.

I therefore propose a substantial program of fleet reduction through the purchase of vessels and licenses from voluntary sellers. Specifically, I recommend that the following steps be taken:

1. A Crown corporation should be created by an Act of Parliament with powers to deal in fishing vessels and licenses, to borrow and invest funds and to manage its own finances. The objectives of the Corporation (which I shall refer to as the Pacific Fishing Fleet Development Corporation) should be to retire licensed fishing capacity from the salmon and roe-herring fleets to the maximum extent possible with its available funds.
2. The Board of Directors of this corporation should be drawn mainly from the fishing industry or related fields of expertise and should include at least one officer of the Department of Fisheries and Oceans.
3. Funds should be made available to the corporation from three sources:
 - a) An initial grant of \$50 million from the federal government. This exceeds the accumulated increment in salmon license fees not yet expended for the intended buy-back purpose, and to that extent may be regarded as an advance on fees to be collected.
 - b) A substantial portion of the revenue from royalties levied on salmon and roe-herring. As mentioned earlier, I postpone until my final report the question of funding the Salmonid Enhancement Program, and so also the division of royalty revenue between this program and the buy-back program. Here, it is sufficient to propose that the share to be devoted to buy-back purposes should be substantial.
 - c) Borrowing. The corporation should be empowered to borrow to a maximum of \$100 million.
4. The corporation should be required to rebate, to licensees who elect to convert their ordinary salmon or roe-herring licenses to temporary licences, the royalties paid in respect of their landings.
5. The corporation should be empowered to rebate, to any vesselowner who assigns an option to the corporation for his fishing privileges, the royalties paid in respect of salmon and roe-herring landed under his licenses during the term of the option.

The corporation should be given maximum flexibility in conducting its operations. It may find dealing directly with

licensees or agents and brokers advantageous. It should be free to take advantage of market circumstances; to purchase licenses with vessels or to compensate licensees for relinquishing their licenses alone in response to the offers which it considers most favourable. In addition, it may well find it desirable to acquire options on vessels and licenses by means other than those proposed above, without any royalty consideration, to secure the opportunity to purchase vessels at prices determined in advance.

In negotiating the options, the corporation should also be free to purchase separate options on licensees' vessels if it seems desirable to do so, to determine the option price and to determine the method for arriving at an option price later, in whatever manner is mutually agreeable to it and the sellers.

The corporation or its agents should be free to dispose of vessels whenever they will bring the best price in Pacific fisheries or elsewhere, and to recycle the receipts for further acquisitions. I am advised that there is a considerable interest in west coast fishing vessels in a number of developing countries that are among those that Canada accords priority for economic aid; I suggest that Canadian government foreign assistance agencies carefully examine opportunities for disposing of surplus vessels in ways that would complement this buy-back program.

The processing companies that own fleets should be required to participate in this buy-back scheme. In the previous chapter I recommended measures to prohibit such companies from increasing their control of the fleet; with fleet reduction, they should also be required to reduce their control at least proportionately. I expect they will do so willingly. I suggest that the Department consult with the processing companies to confirm this and that compulsory legislation be regarded only as a last resort. The objective should be to ensure that the proportion of the fleet controlled by these companies will not increase and that within the group the holdings will not become more concentrated in the largest. Beyond these requirements, participation in the buy-back scheme should be made as flexible as possible.

I emphasize that the proposed corporate structure is an essential condition of the recommended buy-back program. Only in this way can the funds allocated for this purpose be accounted for separately and freed from the vagaries of year-to-year government budgeting. The established procedures of the Treasury Board and governmental Departments are not suited to an operation such as this, which must be flexible, businesslike and capable of making quick and independent financial decisions. The operation should thus be largely separate from the Department of Fisheries and Oceans, and provide for a large degree of control by the fishing industry. The proposed corporate structure thus would meet the essential conditions for an effective fleet-reduction program.

It is impossible at this stage to predict how many years the corporation will need to eliminate excess fleet capacity,

but its objective should be to do so as quickly as possible, and its role should be reviewed within five years.

CONCLUDING NOTE

The set of proposals in this chapter is an attempt to break the log-jam in fleet rationalization. They are ambitious, but they are manageable, and I see no piecemeal measures that offer much promise. The measures suggested are designed to put in order the framework of governmental regulation and to engage the industry in trying to improve its own structure and performance.

The ultimate goal in all these recommendations is to improve the economic performance of these fisheries. To do so will require heavy expenditures that can and should be financed by the industry itself. This will mean that the government and public cannot expect to receive much financial return from the fisheries for some time. The policy should not be directed at short-run gains to vesselowners. (Any rise in license values should be regarded as a signal to raise royalty rates.) Rather, the policy objective should be to recover as much of the value of the catch as can reasonably be borne by the industry and to direct these revenues toward improving the resource and the structure and performance of the industry. This will, in the long run, benefit everyone.

FOOTNOTES

1. Exhibit #76, p.5.
2. Minister of Fisheries, Press Release, September 6, 1968.
3. See G. Alex Fraser, License Limitation in the British Columbia Salmon Fishery, Environment Canada, Fisheries and Marine Service Technical Report Series No. PAC/T-77/13. Vancouver, 1977.

Peter H. Pearse, Rationalization of Canada's west coast salmon fishery: an economic evaluation, in Economic Aspects of Fish Production, Organization for Economic Cooperation and Development. Paris, 1972. p. 172-202.

Blake Campbell, Problems of Over-expansion in the Salmon Fleet in British Columbia, Department of Fisheries and Forestry. Vancouver, 1971.

P.H. Pearse and J.E. Wilen, Impact of Canada's Pacific Salmon Fleet Control Program, Journal of the Fisheries Research Board of Canada, 36(7). Ottawa, 1979. p. 764-9.
4. Fernand J. Doucet and Peter H Pearse, Fisheries Policy for the Pacific Coast: Issues and Advice. A report to the Minister of Fisheries. Vancouver, 1980. p. 26.
5. Figures provided by the Department of Fisheries and Oceans.
6. Fisheries Improvement Loans Act, Annual Report 1979-80, Department of Fisheries and Oceans. Ottawa, 1980. (Exhibit #37a.)
7. Figures provided by the Department of Fisheries and Oceans.
8. West Coast Salmon Fleet Development Committee Report, Fisheries and Marine Service. Vancouver, 1973. p. 8.
9. Sol Sinclair, A Licensing and Fee System for the Coastal Fisheries of British Columbia, Department of Fisheries and Oceans. Vancouver, 1978 (2 vols).
10. Commercial Fisheries and Mariculture: A Policy for the 1980's, Ministry of the Environment. Victoria (undated).
11. Commercial Fisheries and Mariculture.
12. West Coast Salmon Fleet Development Committee Report, p. 7.

CHAPTER 7

Indians In The Commercial Fisheries

"The fishery is our heritage. In it rests our expertise and our hopes for the future."

NUU-CHAH-NULTH TRIBAL COUNCIL¹

The Commission's terms of reference instruct me to make recommendations for ensuring that the fisheries make "the highest possible contribution to the economic and social development of the people of Canada . . ." With respect to the commercial fisheries, the concern for social as well as economic advantage focuses attention especially on native Indians.

When the modern commercial fishery developed in the last century, the Indians adapted to the new technology of fishing and canning much more readily and successfully than they adapted to other industries. The fisheries provided them with an opportunity to participate in the new industrial society, and for a great many, it was the only opportunity. As a result, Indians have held a particularly important place in the Pacific fisheries, and fisheries policy has been moulded, with mixed success, to accommodate their special needs.

This Commission has received a remarkable amount of information and advice from Indian organizations and individuals. Eight tribal councils and eight bands, as well as the Native Brotherhood of British Columbia, the Union of B.C. Indian Chiefs, Indian cooperatives and individual Indians, have submitted briefs. In addition, many other participants have commented on the special problems of Indians. And the Commission has held eight of its community meetings either on reserves or in communities where Indians are dominant.

With respect to the position of Indians in the commercial fisheries, the testimony has had a consistent theme: Indian participation has been declining, and because the fisheries afford a unique economic opportunity for them, this trend must be reversed. This chapter is devoted to this problem. It reviews the history of Indian participation and the policies adopted to promote it, and recommends some initial steps toward improvement.

INDIAN PARTICIPATION IN THE COMMERCIAL FISHERIES

Before European settlement, a much larger population of Indians than survives today was settled in communities

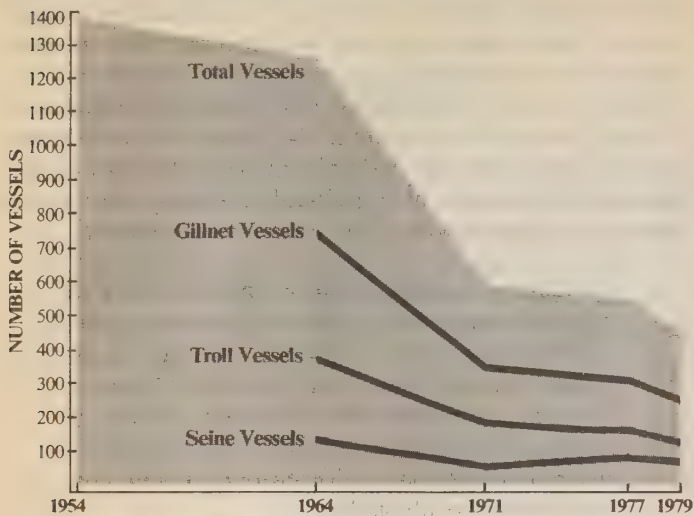
along the coast and the river systems of the interior, in locations that were determined in large part by accessibility to fish resources, especially salmon. Fish formed the foundation of their local economies and inspired many of their ceremonies and myths and much of their folklore and art. Through all the dislocations and painful adjustments to "white" society, involvement in the fisheries has been essential for the Indians in maintaining their identity and self respect. This theme was introduced repeatedly in presentations to this Commission. One group put it as follows:

Participation in the fishing industry allowed us to remain living by the sea with our own people. And it was a kind of work that was more compatible with our way of life than other kinds of work in the white man's economy. It was, if nothing better, at least the lesser of two evils. It did not require us to give up our communities and our culture altogether.²

As described already in this report, the early salmon fishery developed with centres of operations widely scattered along the coast. Canneries were typically located near major salmon runs in inlets and estuaries, where Indian communities were also located. They drew heavily on those communities for men to operate their vessels, and in addition, they provided employment for thousands of Indian women and older children in the canneries. By 1919 there were 97 canneries on the coast from the Fraser River to the Nass, on Vancouver Island and on the Queen Charlottes. They employed more than 9,000 people, the majority of whom were Indians, and Indians accounted for more than one-third of all salmon fishermen as well.³ Indians adjusted remarkably well to this industry, even to the technological changes that brought a wholesale shift to powered fishing vessels and mechanized canning processes.

During the 1920's and 1930's Indian fishermen were displaced by the trend toward larger, costlier fishing vessels and packers. As well, the consolidation of canneries reduced opportunities for many native cannery workers. For some years the decline was slowed by the practice of transporting Indian fishermen and their families from the south to the canneries of the central coast for two months each summer. During World War II, the strong demand for fish temporarily improved Indian employment, and the expulsion of Japanese from the coast enabled many Indians to acquire fishing boats at favourable prices.⁴ However, after the war Indian employment in the fisheries declined sharply.

This more recent displacement was caused by accelerated consolidation of the canning industry into fewer, larger operations and the adoption of bigger, more mobile and heavily equipped fishing vessels. By 1970 there were only 15 canneries operating, all but three in the Fraser and Skeena areas. Their employees had been reduced to about 3,700, of which only about 1,500 were Indians in the 11 plants of the north and central coast.⁵

Figure 7-1 Postwar trends in Indian participation in the salmon fishery.^a

^a Data refer to vessels licenced, but not necessarily active in any year, and are not precise.

Sources: H. Hawthorn et al., *The Indians of British Columbia*, University of Toronto Press, 1958; M. Friedlander, *Economic Status of Native Indians in British Columbia, 1964-1973*, 1975; W. McKay and K. Ouelette, *Review of Indian Fishermen's Emergency Assistance Program, 1978*; and Exhibit # 141a, Appendix VI.

Many Indian fishermen fished in local waters close to canneries, using smaller, older vessels rented from the processing companies. Their numbers declined sharply as canneries closed down, especially on the central and northern coast. On the west coast of Vancouver Island, local fish camps that Indian troll fishermen relied upon to buy their fish also closed. Moreover, Indians were unable to raise the capital for larger, more powerful and more mobile vessels and for sophisticated gear. So they were unable to compete.

Table 7-1 Numbers of licenses for restricted fisheries held or exercised by Indians in 1980^a

licensed fishery	number of Indian licensees	vessels rented by Indians from companies	percent of total fleet
salmon ^b			
gillnet	252	205	20
seine	72	55	25
troll	128	—	7
total salmon	452	260	15
roe-herring			
gillnet	402	—	31
seine	62	—	30
halibut	10	1	2
spawn-on-kelp			
Indian bands	5	—	—
individual	13	—	64

Source: Department of Fisheries and Oceans

^a The figures provided in this Table are approximate estimates.

^b Figures for the salmon fishery are for 1979 and include ordinary, Indian and temporary licenses.

In about two decades the number of vessels owned by Indians in the salmon fleet fell by roughly 60 percent, to 599 in 1971 as shown in Figure 7-1. Between 1964 and 1971 the

number of gillnetters declined by about 400, to 345. Indian-owned trollers dropped from 388 to 197, and seiners, from 135 to 57. Non-salmon vessels owned by Indians, while few in number, declined even more rapidly during this period, from 12 percent of the total fleet in 1963 to less than one percent in 1971. By the beginning of the 1970's, fishing and processing employed less than half the number of Indians that had been involved two decades earlier. Since restrictive licensing was introduced for the salmon fishery 12 years ago, the number of Indian salmon licensees has declined substantially. Table 7-1 shows the number of Indian license holders in 1980. As well, Indians operate something in the order of 60 percent of the vessels rented by processing companies; of the 260 licensed vessels rented by Indians in 1979, 55 were seine vessels and the remainder gillnetters.

The marked decline in Indian vessels in the commercial fisheries during this century does not fully reflect the decline in gainful employment, of course. The erosion of employment in fishing and related occupations has had a devastating impact on dozens of Indian communities that offered no other employment opportunities and where unemployment was already chronic.

We have a sole economy, that of fishing, and have managed to continue participation in this resource industry as commercial fishers, but each year the ability to participate has lessened.... In one century, we have been dispossessed of the ability to provide for ourselves.⁶

Displacement from the fishery created severe economic and social problems beyond those normally attributed to unemployment. For example, vessels were displaced that had been depended upon for food fishing and for transportation links with other communities.⁷

POLICIES TO PROMOTE INDIAN PARTICIPATION

The magnitude of Indian displacement and the severity of the problems it had created drove the Department of Indian and Northern Affairs and the Department of Fisheries and Oceans to adopt measures to protect and, if possible, to increase the participation of Indians in the commercial fisheries. A brief review of these experiments is instructive in designing policies for the future.

Provisions for Indians under Restrictive Licensing

Under the restrictive licensing systems introduced in the Pacific fisheries and described in preceding chapters, a number of special arrangements were made for Indians.

Salmon licensing The salmon fleet control program introduced in 1969 initially had the effect of accelerating the long-term decline in Indian participation in the fishery, a result that was feared from the start. To arrest this trend, several measures were taken:

- In 1970, funds were provided by the Department of Indian and Northern Affairs to purchase derelict vessels from the existing fleet in order to create a "tonnage

bank," which was administered under the Indian Fishermen's Assistance Program (discussed below). Indian fishermen wanting to introduce vessels into the salmon fishery were allocated the required tonnage for vessel licenses out of this bank.

- b) In 1969 and 1970, whenever an Indian applied for a temporary ("B") license rather than an ordinary ("A") license, the Department of Indian and Northern Affairs was notified and in most cases was able to arrange for the higher ordinary license fee to be paid.
- c) In 1971 the Indian license ("A I") was created and any Indian could convert his ordinary license to this new category, which carried a fee of only \$10. Vessels with Indian licenses were ineligible for purchase under the buy-back program, but they could be transferred to other Indians (or to non-Indians by converting the license to an ordinary license by paying the accumulated difference in fees between the two categories of license). Some vessels were purchased by the Department of Indian and Northern Affairs which transferred the licenses to the Indian Fishermen's Assistance Program's tonnage bank, to be made available to Indians who required assistance.
- d) In 1972 all temporary ("B") licenses held by Indians were converted to Indian ("A I") licenses. Sixty-three licenses were changed under this provision, but they were mostly on small boats and only 52 of them were renewed as Indian licenses the following year.
- e) After 1979, holders of Indian licenses were no longer permitted to convert them to ordinary licenses for sale to non-Indians.

Despite these special provisions, the number of Indian participants in the salmon fishery declined during the first few years of restrictive licensing. In the first two years alone the number of Indian gillnetters dropped by 29 percent. This was offset in part by an increase in Indian-owned seiners and trollers, which was apparently the result of aid provided under the Indian Fishermen's Assistance Program (discussed below). And the number of Indian vesselowners and crewmen had fallen by 8 percent.⁸

One reason for this decline was that many Indian vesselowners failed to meet the initial landings qualifications required to obtain a salmon license. A second was the sale of Indian vessels with ordinary licenses through the buy-back program. And a third was the inability of some Indian vessels to pass the inspection for quality standards introduced in 1973. However, for a few years after 1972, with the help of the Indian Fishermen's Assistance Program, Indians were able to maintain and even increase their relative position in the salmon fisheries.

Roe-herring licensing Two important provisions were incorporated into the roe-herring licensing system to encourage Indian participation: no restrictions were imposed on Indians until 1977, though licenses for non-Indians were limited three years earlier; and Indian roe-

herring licenses carry an annual fee of \$10, rather than the \$200 for gillnet and \$2000 for seine licenses issued to non-Indians.

In 1980, there were 62 Indian seine licenses and 426 gillnet licenses active in the roe-herring fishery. Existing regulations require that Indian licenses not be leased to non-Indians. (While some people have suggested that this still happens quite frequently, no firm evidence has been found to indicate that this is the case.) However, there are indications that processing companies have acquired equity interests in some Indian-owned herring seine vessels.

Licensing in other fisheries For the halibut fishery, special licenses are issued annually to Indians who depend on halibut for a significant part of their income but who did not qualify for the restricted halibut licenses introduced in 1979. Currently, there are only ten such licenses. Also, as a general Departmental policy, individual Indians and band councils are given priority for new licenses in the roe-on-kelp fishery. At present, Indians hold 18 of the 28 licenses in this fishery.

The Indian Fishermen's Assistance Program

In 1968, the Indian Fishermen's Assistance Program was introduced to improve Indian participation in the Pacific fisheries. The program had three primary objectives:

- a) To arrest the decline in the number of Indian vessels and, if possible, to reverse it;
- b) to improve the earnings of Indian vessels so they equalled the average of the rest of the fleet; and
- c) to improve the versatility and mobility of the Indian fleet to the level of the rest of the fleet.

Secondary objectives included assisting Indians who operated rental vessels in becoming owners; helping young Indians to enter the fishing industry; maintaining a "tonnage bank" to assist Indians with licenses; improving training and fishing skills; and assisting in developing shore facilities for fishing vessels on reserve lands.

The program was funded by the Department of Indian and Northern Affairs and administered by the Department of Fisheries and Oceans through the Indian Fishermen's Development Board on which Indians as well as the two government Departments were represented. Some \$16.3 million had been expended by 1979 when the Program ended, about half in grants and half in loans. Until the end of 1978 the recovery on loan payments was an impressive 91 percent; since then the rate has fallen as a result of poor returns from fishing.

Coupled with the special licensing provisions for Indians, the Program achieved a good measure of success in terms of its main objectives. First, while the portion of the salmon fleet owned and rented by Indians had declined to 15 percent in 1969, by 1977 it had increased slightly to 16 percent. The increase was entirely in Indian-owned seine vessels, which increased by nearly 60 percent to 27 percent of the

total seine fleet. Indian gillnetters and trollers declined at about the same rate as non-Indian vessels.

Second, the average gross earnings of Indian vessels increased from a low of 61 percent of the average for the salmon fleet as a whole in 1967 to a high of 109 percent in 1973, and averaged 84 percent during the last five years of the Program. The average gross earnings of the vessels that were assisted under the Program were almost half again as high as the average earnings of all Indian vessels over the Program period. The value of landings by Indian vessels in species other than salmon (mostly herring) increased from less than two percent in 1969 to more than nine percent in 1977. Third, the "versatility and mobility" of Indian vessels were improved. The total tonnage of Indian vessels increased by 33 percent, more than double the rate for the fleet as a whole, and their average value increased from 67 to 87 percent of the average for the whole fleet. The vessels that were assisted by the Program were valued 31 percent above the average for all vessels.⁹

Assistance was extended to 59 Indians to purchase rental vessels, and 52 operators of rental boats received aid to purchase gear and equipment. Eighty-five grants were made to bring older vessels to the minimum standards required for licensing.

The program was less successful in encouraging younger Indians to enter the fishery; many were deterred by the requirement of a 12.5 percent minimum down payment (20 percent prior to 1974) to purchase a vessel. The attempt to promote construction of shore facilities in Indian communities to increase efficiency of fishing operations also met with little success.

The main criticism of the Indian Fishermen's Assistance Program was that it benefited primarily those Indians who were already well-established and successful fishermen. It probably also increased the disparity of earnings across the Indian fleet. Furthermore, by providing financial assistance, it contributed to the problem of overcapitalization and excess capacity in the fleet, especially in the seine sector. However, in the context of the restrictive licensing program described in the preceding chapter, this latter result must be regarded as almost inevitable if the competitive position of Indian fishermen was to be improved.

The Indian Fishermen's Emergency Assistance Program

In spite of the substantial assistance provided under the Indian Fishermen's Assistance Program and the special licensing arrangements for Indians, the number of Indian salmon vessels began to decline sharply after 1977. Between 1977 and 1980, the Indian-owned fleet dropped by some 100 vessels.¹⁰ These fell into two groups: better vessels (including several that had benefited from IFAP assistance) that were sold to non-Indians in order to reap the capital gains from inflated license values in the boom years of 1977 and 1978; and submarginal vessels that survived the prosperous years but failed in the poor years that followed.

Indians and the Department of Indian and Northern

Affairs were afraid that the conspicuously poor year of 1980 and the bleak prospects for 1981 would accelerate the displacement of Indians. As a result, a stop-gap emergency program was implemented late in 1980, the Indian Fishermen's Emergency Assistance Program. Its purpose was to assist with payments on debts, repairs, equipment and start-up costs of Indians threatened with bankruptcy.¹¹ This Program is funded by the Department of Indian and Northern Affairs and is administered by two Indian-controlled boards: one is controlled by the Native Brotherhood of British Columbia; the other, by the 13 bands of the Nuu-Cha-Nulth Tribal Council. It provides \$2 million in grants, another \$2 million in loan guarantees and \$200 thousand in direct loans.

By September of this year, some 200 fishermen had received assistance under this Program in varying amounts averaging about \$10 thousand, mostly in the form of grants. About half was used to make payments on loans in arrears; the rest was used for essential repairs, alterations and new equipment for vessels.

This Program has two significant deficiencies. First, very little assistance could be provided in the form of loan guarantees. Apparently, because of the depressed condition of the industry, banks have been reluctant to extend even guaranteed loans to fishermen. Second, no assistance could be provided to make payments on loans from the Indian Fishermen's Assistance Program because of a rule that federal funds cannot be used to write off debts to the federal government. This is important, because these loans are the largest form of debt for many Indian vesselowners.

Nevertheless, emergency funds for vessel repairs, start-up costs and essential equipment enabled many Indian fishermen, who otherwise probably could not have operated, to fish in the 1981 season. And because this has been a fair season for salmon, these fishermen have been able to improve their financial position.

The Salmonid Enhancement Program

The ambitious Salmonid Enhancement Program is described in some detail in Chapter 11. I include some discussion of it here because one of its official objectives is to improve Native well-being, which implies improving incomes and employment for Indian fishermen and cannery workers.

Several criticisms have been made about this program regarding Indian involvement. Most important is its geographical orientation: projects are concentrated in the south coast, especially in the Johnstone Strait area, where Indian fishermen and communities are already relatively prosperous.¹² Another criticism made by many Indian groups is that the program has focused too heavily on large hatchery projects; they argue that a greater emphasis on small stream improvement projects would yield greater benefits to Indians and their communities.

Partly in response to such criticisms, a formal Community Development Program was initiated under the Salmonid

Enhancement Program in 1979, mainly for the benefit of Indian communities. Its present budget provides \$3 million annually for 15 community development projects, of which nine are with Indian communities. During the next five years the Department tentatively proposes to expand the Program to 62 projects at an additional cost of \$45 million.

Community development projects are contracted to Indian bands and other groups, who assume responsibility for specific works, such as small hatcheries, stream rehabilitation and resource surveys. The Department provides technical advice to the contractor and a training program for those involved in the project. Problems of one kind or another have arisen in most projects, but the Program has been generally successful (see Chapter 11). The response from Indians has been enthusiastic; about 150 Indian communities have applied to undertake projects. This interest is the main reason for expanding the Program.¹³

The Indians' main criticism of the Program is that the Department gives the contracting bands insufficient control over the projects, a criticism that must be weighed in light of the experimental and risky nature of much enhancement work. Other concerns are that funds are insufficient or not disbursed promptly and that Indians have inadequate influence over the general design of the Program.

Indian Aquaculture

The Department of Indian and Northern Affairs, in cooperation with the Marine Resources Branch of the Ministry of Environment for British Columbia and the Department of Regional Economic Expansion, is currently attempting to develop a program for native Indian involvement in aquaculture. This program recognizes the keen interest of coastal Indian bands in aquaculture, the strategic location of resources for aquaculture, and the provincial government's interest in encouraging Indian participation in this activity.¹⁴

So far, the provincial Ministry has sponsored a pilot project involving oyster culture by the Penelakut Indian Band. The federal Department proposes that a firm of consultants be engaged to design other pilot projects based on shellfish and seaweed culture over the next two years. These are intended to provide experience in developing a long-range program for involving native Indians in aquaculture.

This cautious approach, involving Indians in the earliest stages of program design, is undoubtedly appropriate in view of the uncertainties of commercial success. But the potential is substantial, so the program deserves continuing support. Eventually the respective roles of the two governments will have to be clarified in view of the federal responsibility for fisheries and economic development on Indian reserves and the provincial responsibility for aquaculture.

Observations on Experience

The historical record leads to certain general conclusions relevant to determining appropriate future policies.

First, apart from brief intervals, and despite efforts to pre-

vent it, there has been large-scale displacement of Indians from the commercial fishing industry in recent decades.

Second, as numerous studies and submissions to this Commission have confirmed, this decline has generated serious economic and social distress in Indian communities, many of which offer no alternative employment. The relative immobility of Indian people has left them heavily dependent on unemployment insurance and welfare payments. This is costly to the taxpaying public and, at the same time, inflicts high costs on the Indians themselves in the form of idleness, dependency, demoralization and social and personal breakdowns.

Third, Indians can obviously adapt and perform well in the commercial fisheries. Because of their greater familiarity with fish and the activities associated with fishing, coastal Indians have stronger motivation, greater skill and more experience to support their participation in commercial fishing than they do in most other fields. In contrast, developmental programs based on commerce, tourism and related activities, which are largely alien to Indian cultures and traditions, have usually been unsuccessful. In short, the commercial fisheries afford a highly promising means of involving coastal Indians in constructive economic activity. Moreover, it is an activity in which many of them claim a historic right to participate. The fisheries, then, must be regarded as an obvious base for policies aimed at Indian social and economic development.

Past experience also shows that, in the rapidly changing environment of the commercial fishing industry, expecting developmental programs to be entirely self-supporting is unrealistic. They will likely need external support and subsidization for a considerable time. Decades of dependency and exclusion from economic opportunities have left widespread apathy, coupled with passive and sometimes active resistance to public authority. Indian culture and traditional means of livelihood have been overwhelmed by a complex "white" society with its rapidly changing technology, and by the organizational structures imposed upon them. Their self-development has been retarded by a governmental approach to Indian administration that, until recently, tended to be authoritarian and paternalistic.

Indians have also experienced difficulty in obtaining the same financial assistance available to their non-Indian competitors:

[Indians] do not have access to the capital resources required for investment in large new vessels or expensive equipment. Generally low incomes plus the fact that reserve land cannot be secured as collateral has limited most Indians' ability to borrow money from traditional financial institutions.¹⁵

Policies for increasing Indian participation in the fisheries must recognize these special problems.

For many coastal Indian communities, the basic policy choice is now fairly clear. It is between increasing subsidies

to coastal Indian communities in the form of welfare funds and personnel needed to cope with the growing problems of unemployment, dependency and demoralization, on the one hand, and subsidizing fisheries programs that will provide productive employment and contribute to individual and community morale, on the other. I have no doubt that the latter is the most constructive not only from the point of view of the Indians themselves but from that of Canadians generally. The position the Indians take concurs with this judgement:

It makes more sense to enhance the ability of Indian people to support themselves through the fishing industry than it does to spend increasing amounts of federal revenue supporting them on social assistance.¹⁶

But to successfully increase the involvement of Indians in the commercial fisheries, and thereby to increase their self-reliance in the long term, will require sensitive and costly programs. Many of the benefits sought are difficult to measure in economic terms because they involve unquantifiable social, psychological and cultural improvement. But this does not mean that they are less important than more quantifiable economic benefits.

POLICY PROPOSALS

In approaching recommendations for improving Indian participation in the commercial fisheries, several general problems brought to this Commission's attention must be addressed. One is the role of the Department of Fisheries and Oceans. As I suggested in Chapter 4, the Department is obliged to modify and adapt its policies and procedures to accommodate social policy objectives relating to the fisheries, and to provide the technical expertise to help ensure that the objectives will be met; but it is not the appropriate agency to undertake either the designing or the funding of needed social programs. In the past the Department has, in the opinion of some, become too deeply and directly involved in efforts to solve Indian problems; it has therefore been seen as the agency responsible for these problems and become a target of criticism. Thus, many Indian groups that have appeared before this Commission have expressed frustration and even hostility over the Department's apparent insensitivity to their problems.

The Department of Indian and Northern Affairs, with its direct responsibility for Indian affairs, is best placed to initiate and financially support programs of social and economic development for Indians. The Department of Fisheries and Oceans must adapt its policies to accommodate these programs without obstructing the objectives of Indian administration or of the Indians themselves. Of course, the technical and administrative advice of the Department of Fisheries and Oceans should be sought in designing any such projects involving the fisheries.

For the reasons presented above, I regard it as essential that the government initiate a well-defined program to pro-

tect and expand Indian participation in the commercial fisheries, using the considerable experience of past programs of assistance. It should have long-term goals, and hence be more than an emergency aid program, though its ultimate objective should be to eliminate the need for its continuance. Accordingly, it should not only assist Indian vesselowners to improve their productivity and young Indians to enter the fishery for the first time, but also provide training to enable them to succeed.

In the present circumstances of the Pacific fisheries, any program designed to encourage Indian participants must be compatible with the general need to rationalize and reduce the overexpanded fleets. This presents an obvious difficulty, and it calls for a careful program design. First, it requires that any additional fishing licenses made available to Indians be drawn from the existing stock, rather than being added to it. Second, it requires that provisions be made to ensure that Indian licenses will remain in Indian hands, rather than be transferred to non-Indians. Third, it requires that provisions be made to ensure that Indians will have access to credit and financial support that will enable them to operate and improve their position. Finally, it should provide for a high degree of Indian participation in the program's administration.

These conditions are largely met by the Indian Fishermen's Economic Development Program proposed by the Native Brotherhood of British Columbia. Following extensive consultation within the Indian fishing community, the Program has been the subject of intensive planning during the last two years by a working committee consisting of representatives of the Brotherhood and the Departments of Indian and Northern Affairs, Fisheries and Oceans, and Employment and Immigration. It has since been discussed at length with the federal government.

The proposed Program was presented in a submission to this Commission with a recommendation that this Commission endorse it.¹⁶ I support this proposed program in general outline, at least, and recommend that the government proceed toward implementing it as quickly as possible. In view of the fact that negotiations are already taking place, however, I refrain from making recommendations on matters of detail.

The essential objectives of the program are to provide financial assistance to young Indians to enable them to acquire vessels and enter the industry, to provide training in fishing skills and business management, to secure a permanent block of fishing licenses for Indian fishermen, and to assist Indian owners of marginal vessels to improve them.

The proposed structure is designed to alleviate some of the problems encountered by the earlier Indian Fishermen's Assistance Program. The program would be managed by a corporation, the Indian Fishermen's Development Corporation, which would be a non-profit organization controlled by Indians. Directors would be elected from regional groups of Indians traditionally involved in commercial fishing to ensure representativeness and equitable treatment.

To stabilize the Indian presence in the fisheries, the corporation would purchase licensed vessels from non-Indians, sell or otherwise dispose of the vessels, and grant the licenses to qualified Indian applicants, who would purchase or construct their own vessels suitable for licenses under the prevailing vessel replacement rules. Depending upon their financial circumstances, recipients might be provided with additional assistance from the corporation.

Preliminary discussions with the Department suggest that it might be desirable to create a new category of Indian licenses for this purpose that would unambiguously prohibit their transfer to non-Indians. This would ensure that these licenses would never leave the Indian community. At the same time the interest of the corporation in acquiring licenses should strengthen the value of fishing privileges ("AI" licenses) which are presently limited to Indians.

The current proposal calls for a budget of about \$20 million over five years to meet the costs of purchasing licensed vessels, upgrading existing vessels, training and administration. It is proposed that this be funded by a governmental grant, provided through a special allocation from the budget of the Department of Indian and Northern Affairs, the Western Development Fund and/or other sources.

The working committee that designed this proposal advocated that it incorporate the proposal to expand the community development program component of the Salmonid Enhancement Program. Accordingly, this has been integrated with the plan in a joint submission to the government.

An issue that is not addressed in the proposal is that of the possible continuing need for operating subsidies for

Indian fishermen. Many Indian fishing operations are marginal, and the objectives of the program imply that they may require financial assistance. Consideration might therefore be given to retaining some of the staff and resources of the Indian Fishermen's Emergency Assistance Program for at least a further temporary period for the purpose of monitoring the financial performance of Indian fishing operations. In the long run, some of the possible alternative approaches to fisheries regulation described in Chapter 4, such as fishermen's quotas and area licenses, might strengthen Indian participation.

The corporation proposed for this program should be independent of the Pacific Fishing Fleet Development Corporation recommended for fleet rationalization purposes in the preceding chapter. They may find grounds for beneficial cooperation (for example, any options on licenses held by the latter corporation which it decides not to exercise might be made available to the Indian corporation), but I see no need for a formal link between the two.

In summary, this program appears to be a well-conceived and constructive approach to the problem of Indian participation in the commercial fisheries, and offers considerable promise for improving the economic opportunities of coastal Indian communities. It is a costly program, but the alternative of not undertaking it is likely to be even more costly, not only in economic terms, but also in terms of social distress among Indian people. Moreover, if it is successful in its objectives, the cost will decline as Indian fishermen become more self-reliant. If the other proposals in this report are also adopted and prove successful, this improvement in the position of Indian fishermen will be accelerated.

FOOTNOTES

1. Exhibit #15, p. 8.
2. Exhibit #15, p. 6.
3. W.F. Sinclair, The Importance of the Commercial Fishing Industry to Selected Remote Coastal Communities of British Columbia, Department of Environment. Vancouver, 1971.
4. H. Hawthorn, C. Belshaw and S. Jamieson, The Indians of British Columbia, University of Toronto Press. Toronto, 1958. p. 113.
5. W.F. Sinclair, The Importance of the Commercial Fishing Industry. p. 16; W. McKay, The Native Commercial Fisheries and the Potential Impact of Oil Spills, Environment Canada. Ottawa, 1978. p. 19.
6. Exhibit #89, section 4, p. 8.
7. See Exhibits #89 and #15.
8. Blake Campbell, An Assessment and Evaluation of the Salmon Vessel License Control Program 1968-73, Fisheries and Marine Service, Department of the Environment. Vancouver, 1974. Table 24 and p. 46-58.
9. W. McKay and K. Ouellette, Review of Indian Fishermen's Assistance Program, 1968-69 - 1977-78, Department of Indian and Northern Affairs. Vancouver, 1978. p. 13.
10. "Native Fisheries," a background paper prepared for this Commission by the Department of Fisheries and Oceans, August 1981. Table 2, p. 18.
11. W. McKay, "The Indian Fishermen's Emergency Assistance Program", memorandum prepared for this Commission. Vancouver, August 1981.
12. C. Cummins, M. Friedlaender and D. Williams, Impact of the Salmonid Enhancement Program on Native People, Fisheries and Marine Service, Environment Canada. 1978, p. 34; see also Exhibit #89.
13. "Native Fisheries", p. 21.
14. A recent policy statement of the government of British Columbia states an intention to "consult with Indian people with respect to resource management and development plans that affect their traditional uses of and special interests in marine resources." Commercial Fisheries and Mariculture: A Policy for the 1980's, Ministry of Environment. Victoria, (undated).
15. Exhibit #129, p. 18.
16. Exhibit #15, p. 18.

Part Three

Non-Commercial Fisheries

CHAPTER 8

The Indian Fishery

"Traditionally, the fisheries resource formed the economic base of the entire West Coast. The sea, rivers and lakes were their [the Indians] larder. They harvested their needs as required and they preserved for future needs the surplus of their requirements. They developed a very close spiritual relationship to all these resources, and to the total environment, and there were also many taboos established by the Indian people and instilled into the minds of the younger generations with each successive generation, to safeguard the continuity of these resources of the salmon."

GODFREY KELLY¹

The Indian fishery puts relatively small demands on the fish resources of the Pacific coast, but it involves issues of profound social, political and economic consequence. It is a complicated and often contentious aspect of fisheries policy. This is reflected in the remarkable amount of testimony this Commission has received on the question of Indian fishing, from Indian bands, tribal councils and individuals, and also from commercial fishermen, sportfishermen and others. Present regulatory policies are obviously unsatisfactory in many respects, and most groups stress the urgent need for reform.

The Indian fishery presents a particularly difficult issue for this Commission. Indian fishing rights are exceedingly complicated in law, as are the traditions upon which they are based and, in addition, they are not widely understood. Few non-Indians have been exposed, as I have, to the extensive testimony of Indian leaders about their traditional fishing, their economic and cultural dependence upon fish, and their problems in exercising what they regard as their historic rights to fish. There is a rich and fascinating cultural heritage unique to the Indians of the west coast. But because it is not widely appreciated, the task of formulating appropriate policies to accommodate it is even more difficult.

Furthermore, the Commission's terms of reference restrict me to consider only Indian fishing rights and their implications for management and conservation of resources. Yet Indian fishing rights are only a part of the much larger and

controversial issues of aboriginal rights and land claims, which have yet to be resolved.

In this chapter I examine the available information about the dimensions of Indian fishing and its impact on resources. I sketch some of the historical background to the present regulatory policies and the conflicts and problems associated with them. I also identify some of the alternative policies that have been suggested to the Commission, and discuss some of the implications of these.

Historical Background

The present Indian fishery, or the "Indian food fishery" as it is commonly called, is a continuation of traditional native Indian fishing practices.² Historically, fish were extremely important to the Indians of the Pacific coast. According to some estimates, fish comprised three-quarters of the diet of coastal Indians and a large but unknown portion of the diet of interior Indians.³ Salmon were by far the most important fish in both regions.

The traditional importance of fish extended well beyond its food value, however. The pattern of Indian settlement can be traced in large part to the accessibility of fish both on the coast, where permanent villages and seasonal camps were located near fishing grounds and, in the interior, where villages and fishing stations were established on rivers and streams near places where salmon could be easily caught. Today, this pattern of Indian settlement remains in large part unchanged. Fish were also a major commodity of trade among Indian bands and tribal groups. Seasonal fishing established the annual routine of life, and the runs and catches of salmon were viewed with reverence since fish were the primary means of survival. The great social and cultural significance of fish, especially salmon, is reflected in the important role they play in the rich traditions of feasts, ceremonies, myths and art.

Indians devised a wide variety of methods for harvesting marine resources, adapting their technology to the circumstances of particular fisheries. Hooks were fashioned from bone or hardwood and attached to lines made of cedar bark or nettle fibre. Spears, harpoons, dipnets and gillnets were common. Weirs and traps were especially effective in catching salmon migrating upstream to their spawning grounds.

Usually, salmon were abundant, but in low-cycle years they were sometimes insufficient for winter food supplies. At such times coastal Indians could turn to groundfish and shellfish to meet their needs, but interior tribes occasionally suffered hunger and starvation. And even in years of abundance, tribal wars sometimes prevented harvests of available stocks.

The fur trade, with its associated forts and trading posts, changed the complexion of the Indian fishery. Indians were encouraged to barter foodstuffs for manufactured goods and dried salmon rapidly became a staple food among fur traders because of its light weight, preservation qualities and rich food value. Reports of early Hudson's Bay Company

inspectors confirm that salmon traded by Indians was essential to the maintenance of life in the trading posts.

Today, under the legislative provisions for traditional Indian fishing, Indians are prohibited from selling or trading in fish caught. However, many still depend heavily on fish for food, although their diets are now much more varied. Some continue to fish with traditional equipment, the technical and economic efficiency of which often compares favourably with that of the modern industrial fishery. Traditional methods of processing fish are also practised and, with the recent renewed interest in traditional culture, its use in feasts and ceremonies has been increasing. As one Indian group put it in testimony to this Commission, "Without fish we have no culture and with no culture we are not a people. To us, the marine resources of B.C. are part of our struggle to survive and to grow."⁴ The Indians' historical attachment to fish and the importance of fish to their cultural identity often surprises non-Indians.

Current Fishing Activity and Catches

The available statistical data on both the amount of fishing activity and on catches in the Indian fishery are very weak. In 1978, about 3,500 individual permits and 50 band permits were issued. In addition, some permits were issued to commercial vessel owners to allow them to catch specified quantities of fish for coastal bands that could not otherwise meet their requirements. But there are many more people involved in the Indian fishery than these numbers suggest. Individual permits are issued to heads of families, but they allow other members of the family to fish as well. Band permits enable band councils to assign fishing rights to any member of their bands. Recent estimates suggest that about 25 thousand Indians in British Columbia benefit directly from the food produced in the Indian fishery; this represents almost half the number of status Indians.⁵

A variety of methods are used to collect data on the catch. Local fisheries officers, who are responsible for reporting this information, have developed their own methods for estimating catches in their administrative areas. Sometimes the whole catch is counted. More often, only a sample of the catch in a few nets is counted and then extrapolated. In some cases estimates are based on interviews after the season, and in others the local officer is provided with reports from the band council or individual fishermen. As a result of these diverse methods, the accuracy of catch estimates is questionable in many cases, and many believe that catches are under-reported.

Salmon are overwhelmingly important, but a wide variety of other species are used in the Indian fishery. Many bands attach a special value to eulachon (ooligan or candlefish), which is used as a source of oil ("grease") and protein and for traditional medicinal and cultural purposes. Some coastal bands take significant quantities of herring and herring roe, some catch groundfish such as halibut and cod; clams, oysters, abalone and other shellfish are also used extensively. Some interior Indians take considerable catches of kokanee (land-locked salmon).

The catch of salmon in the Indian fishery has apparently been increasing significantly in recent years. The estimated catch in 1965 was 350 thousand fish, or roughly 1.6 percent of all salmon landings. By 1976 this had increased to 600 thousand fish and by 1980 to 700 thousand fish, or 3.5 percent of salmon landings⁶. Sockeye is by far the most important species taken, accounting for 50 to 70 percent of the total, but all the other salmon species are used as well. There is no available statistical information on the catch of fish other than salmon because there is no established reporting method.

Most salmon fishing takes place in freshwater on the Fraser, Skeena and Nass river systems, but Indian fishing also takes place all along the coast. The Fraser River is by far the most important source, and accounts for about 60 percent of all the salmon taken in the Indian fishery. Most Indian reserves are located close to the River or its tributaries, and its large summer runs of salmon provide an important part of the Indians' food supply. Fishing is especially intense upstream from Lillooet, where traditional culture and practices are pronounced.⁷ Although the dependence of these Indians on salmon for food has declined to some degree over the years, the fishery remains both a valuable source of protein and an important element in their cultural life.⁸

In the lower reaches of the Fraser River, Indians generally have access to plentiful supplies of fish.⁹ In the upper River above Lillooet, however, they depend on specific, individual stocks, and yearly fluctuations in runs often require strict conservation measures to ensure adequate escapement. As a result, the up-river Indian fishery has been subjected to more frequent closures and other restrictions in spite of efforts by the Department to increase the salmon stocks available to the Indian fishery.

The Skeena and Nass Rivers account for about 30 percent of the salmon catch in the Indian fishery (and a much larger proportion of the eulachon catch). Fish are extremely important to the Indians on these rivers; more than a third participate directly in fishing and a much higher proportion depend on it for food.¹⁰ Fish are a particularly important component of the diet of Indians in the Nass Valley.¹¹ In recent years heavy commercial exploitation has restricted the supplies of certain species for the Indian fisheries on these rivers.¹²

Coastal Indians depend on a wider variety of fish, but some have experienced increasing difficulties in obtaining their customary catches of salmon. Many coastal bands have come to depend on commercial gear, and much of their food fish is taken in the commercial fishing season. But the widespread displacement of Indians from the commercial fishery, described in the preceding chapter, has left some bands without the means to meet their requirements. The Department has partially alleviated this problem for certain bands in Georgia Strait by giving them surplus hatchery stocks and allowing commercial fishermen to harvest these stocks for distribution. This arrangement does

not, however, replace the traditional and social significance attached to Indian fishing.

Development of Regulatory Policy

The present arrangements governing the Indian fishery are the outcome of a century of policy development. Throughout, the basic issue has been that of reconciling the conflict between Indian traditions of fishing and hereditary fishing areas on the one hand, and early English colonial policy, federal-provincial constitutional responsibilities over Indians and fisheries, and the need to conserve fish stocks, on the other. In the evolution of policy, a significant role was played by various Royal Commissions, and the travels and hearings of some of these bear a striking resemblance to those of this Commission.

When British Columbia entered Confederation in 1871, certain constitutional responsibilities having an important bearing on Indian fisheries policy were assumed by the Dominion Parliament. The Dominion's jurisdiction included "sea coast and inland fisheries" and also "Indians, and lands reserved for the Indians." From the beginning, measures adopted regarding the Indian fishery under both of these areas of responsibility recognized a special status for Indian fisheries.

Before 1877, all fisheries in British Columbia were essentially unregulated. The Dominion Fisheries Act, which was applied to the province that year, included the first official recognition of native fisheries in the province by enabling the Minister to issue licenses to Indians to allow them to catch fish for their own use. The British Columbia Fishing Regulations were first adopted under the Act the next year, but it was not until ten years later in 1888 that they dealt specifically with the Indian fishery. A lease or license was required for fishing in all waters of the province, but it was provided that

Indians shall, at all times, have liberty to fish for the purpose of providing food for themselves, but not for sale, barter or traffic, by any means other than with drift nets, or spearing.¹³

Over the ensuing decades the Regulations continued to give special recognition to Indian fisheries, with a few minor modifications and exceptions. In 1894 the "permission" of the Department was required for Indians to engage in the fishery, a requirement that was strengthened by regulations enacted in 1910. Then, a "permit" was required, under which the Department could fix the area where fishing activities could be undertaken, the gear to be used and fishing times.

These provisions continued more or less unchanged until 1977, when new regulations required "licenses" instead of "permits." Although this change caused some anxiety among Indians, it was not really very substantial. As with the former permits, licenses could specify the area, gear and time of fishing, and that the catch must be consumed by Indian fishermen and their families and not sold or traded to others. (In this report I continue to refer to these authorizations as "permits," as they are commonly known.)

Some requirements of these permits are criticized by Indians as being unjustifiable or unnecessarily bothersome. These include the provisions that gear must be marked with identifying tags; that Indians must provide both their Social Insurance Numbers and band numbers as well as certify that they are Indians under the Indian Act; and that (by administrative practice) fishing time must be restricted to three days per week.

In an effort to reduce tension, the Department initiated the practice in 1977 of issuing permits to some Indian bands instead of to their individual members, with the licenses to be administered by band councils. This practice has been formally acknowledged in recent amendments to the Fisheries Regulations. Today, about 10 percent of bands engaged in the fishery participate under this arrangement, and the Department reports few problems with enforcing these permits.¹⁴ Other bands have not yet adopted this arrangement. Individual licenses continue to be issued directly by fisheries officers in these cases, though sometimes they simply supply a number of permits to an Indian community. Another arrangement involves issuing permits to Indian commercial fishermen authorizing them to use commercial gear to catch food fish for distribution to others.

The second relevant field of federal responsibility concerns Indians and Indian lands. A recurrent source of friction between the two levels of government and the Indian community since British Columbia joined Confederation has been the allotment of reserves to Indian bands in the province. Under the Terms of Union that were settled between the two governments, the Dominion assumed responsibility for Indians and their lands, undertaking to pursue "a policy as that hitherto pursued by the British Columbia Government"; and "tracts of land of such extent as it has been hitherto the practice of the British Columbia Government to appropriate for that purpose, shall from time to time be conveyed by the Local Government to the Dominion Government in trust for the use and benefit of the Indians . . ."

Difficulties with interpreting these general expressions led to the appointment of Reserve Allotment Commissions over the 40 years from 1876 to 1916, which were to make recommendations to both governments with respect to reserve lands for Indian bands in the province. In the course of discharging their responsibilities, Commissions frequently recognized traditional Indian fishing locations by allotting to some bands exclusive fishing rights at tidewater and over certain stretches of fresh watercourses, although at the time the Commissioners expressed concern about their authority to do so.

Legal Issues

In recent decades the courts have had difficulty defining the rights of native Indians regarding lands and resources, but their position with respect to federal laws relating to fish and game is fairly well settled. Regardless of aboriginal or treaty rights, laws such as the Fisheries Act, which are designed to provide for resource conservation, must be com-

plied with.¹⁵ But the courts have held that the Indian fishery takes priority over commercial and sport fishing, and that only conservation needs should interfere with Indian fishing.

A number of band councils in the province have enacted by-laws under the Indian Act in an effort to secure control over fishing activities on reserve lands. By-laws typically place no restrictions on Indian fishing, and to that extent they conflict with the Fisheries Act and Regulations, but their legal status is far from clear. The conflict here is not between federal legislation and the rights claimed by Indians, but rather between two federal statutes. Indians claim that the Indian Act, and hence also the by-laws authorized by it, supercede the Fisheries Act, a contention that has been supported by legal advice obtained by the government. According to this view, band councils can assert regulatory control over fisheries on reserve lands by approving an appropriate by-law without consulting with the Department of Fisheries and Oceans. On the other hand, the Department has taken the view that the Fisheries Act must be complied with in all cases, so the Fisheries Act has priority and band by-laws cannot eliminate the obligation of Indians to obtain permits to fish and to observe their terms and conditions.

Three observations should be made about the history of conflict and friction associated with the Indian fishery. First, Indian food fishing has always been accommodated by the federal government. Second, disputes have rarely been over recognition of the special status of Indian fisheries; most have related to enforcement of specific regulations concerning fishing times, fishing areas and gear. Many of the recent charges laid against Indians engaged in fishing have accomplished little, and some have brought requests from the court for the Department and the Indians to adopt a more cooperative, non-adversarial approach to regulating the Indian fishery. Third, the prohibition against the sale of fish caught in the Indian fishery has proven to be exceedingly difficult to enforce; allegations of illegal sales have led to public criticism of Indian fishing, and efforts to control it have caused friction between Indians and the authorities.

Problems and Prospects

Increasingly stringent regulations, particularly those requiring permits or licenses and curtailing fishing times, have been regarded by the Indian community as unfair interferences with their historical traditions and rights. Some have complied with the regulations, but others have refused, leaving fisheries officials with little choice but to prosecute. Growing regulation has meant increased enforcement, which in turn has led to charges and court battles. Already sensitive relations between Indians and the Department have become inflamed, and resentment and mistrust has been aggravated.

We also have been legislated against, arrested or threatened with arrest for practicing our harvest of resources Since regulations, restrictions

and policies have come into existence by the Federal Government, harassment has become a real problem for Indian people. Harassment of Indian Fishing increases as more policies are developed.¹⁶

The present policy governing the Indian fishery is not only unsatisfactory to many Indians, it also gives rise to awkward problems of management and enforcement for the Department. Unless the arrangements are improved, friction between the government and the Indian community will almost certainly increase.

Several concurrent trends can be expected to aggravate present problems. Increasing pressures on resources from the commercial and sport fisheries, in addition to the growing demands of the Indian fishery itself, will inevitably call for improved control of escapements and more stringent regulation of fishing. Moreover, the sharp rise in Indian fishing may well continue in view of the movement of off-reserve Indians back to their communities and the age structure and trends of the Indian populations.

In addition, there is undeniably a growing mistrust between native Indians and the government, much of which focuses on the issue of fishing rights: "... a great deal of harm and bad faith has arisen . . . over the rights . . . to food fish within . . . Reserve waters."¹⁷ This is the result of a long history of resentment over restrictions on Indian fishing, recurrent legal battles, and recently the rejection by the Department of the validity of band by-laws. And pervading all this is the frustration over the slow progress toward resolving the fundamental issues of Indian land claims and aboriginal rights.

It should be emphasized that Indian fishing is not now problematical everywhere. In some areas a very smooth working relationship has developed between the Department and local bands. But in many other areas Indian fishing is contentious, and in some, almost explosive. In the remainder of this chapter I identify the major problems and some of the possible solutions that have been suggested. I stress that in this preliminary report I do not intend to make firm recommendations on these important issues, but only to raise possible avenues of reform.

Priority The Department continues to recognize Indian fishing rights, and accords this fishery first priority in the utilization of fish, subject only to the paramount needs of resource conservation (which means leaving enough spawners to replenish the stocks).

But according first priority to the Indian fishery presents a practical problem, insofar as this fishery usually comes last in line in the sequence of demands on migrating salmon. Giving priority to a catch that is to be taken only after the other, much larger fisheries have taken their toll is exceedingly difficult, especially when the size of the total stock is not reliably known until most fishing is completed. Inevitably, the commercial and sport fisheries sometimes take too many fish to provide sufficient stocks for both needed

escapement and the Indian fishery, and by the time this is known the only way to maintain the stocks is to constrain Indian fishing. This problem is aggravated by the fact that the requirements for the Indian fishery are not quantitatively specified. To overcome this particular difficulty and to give the Indian priority more substance, it has been suggested that Indians be given a right to a predetermined quantity of fish, in effect, a quota. Then regulatory authorities would be obligated to ensure that this quantity was available; and if conservation required that Indians not take their full quota then the fish would have to be supplied in other ways, such as by transporting them from elsewhere. Some arrangements along these lines exist in the State of Washington.

Approaches to regulating fishing I have pointed out the variety of administrative arrangements that are now used to regulate the Indian fishery, and also noted that particular systems appear to work satisfactorily for some bands but not others. This is not surprising in view of the diversity of fishing opportunities, the varying dependence of Indian bands on fish for food, and the range of political organizations and attitudes among Indian communities. These different conditions suggest that the best arrangements are likely to vary from one area to another, so it may be inappropriate to adopt a single policy for all.

The permit system has been adopted as the basic means of identifying legitimate Indian fishermen and of regulating their fishing times and places where this is required. The system is offensive to some Indians and, in some communities without a fisheries officer near at hand, it is inconvenient.

The argument that permits are needed to identify those who are legitimately fishing under Indian fishery arrangements is weak, since status Indians all have identification cards and numbers. However, the function of permits goes well beyond identification of legitimate Indian fishermen. It provides a means of conserving and managing stocks by stipulating fishing in certain places, at certain times and for certain species. By authorizing certain Indians to fish in certain places, the Department can protect their traditional fishing stations from interference by other Indians (and usually does so at the Indians' request). In addition, permits provide a means of obtaining statistical information on Indian fishing activity.

Individual permits issued by fisheries officers, band permits administered by band councils, and fisheries management plans administered under band by-laws represent a progression of responsibility into the hands of Indians themselves. As a general rule, the more responsibility successfully delegated to the Indians in this matter, the better, providing that the needs of fisheries management can be met. Many Indians want this responsibility, and were they given it, the administrative and enforcement problems of the Department would likely be lessened. The feasibility of delegating responsibility varies, however.

The by-law approach that has recently been adopted by some bands may offer an opportunity for Indians to become much more constructively involved in fisheries management and to assume much more responsibility for the regulation of fishing. The major problems with the proposed system are that it would divide authority for fisheries management, it would eliminate the Department's authority to control management and harvesting over part of the migration routes of fish, and would possibly create a multiplicity of independent authorities along a river, which could make effective resource management and conservation impossible.

There may be ways of bridging this impasse, perhaps by legislative amendments that would affirm the primacy of the Fisheries Act in regulating fishing on reserve lands yet would give the Indians the opportunity to adopt fisheries management plans subject to the approval of the Department of Fisheries and Oceans. With this final authority in the Department to authorize catches and management activities, substantial benefits might be realized from greater involvement of Indians in management and enhancement — not unlike those discussed under aquacultural leases in Chapter 4. Approved plans would presumably predetermine the catch to be taken, among other things, and responsibilities for administration, enforcement and reporting would be delegated largely to the Indian bands subject to general overview by the Department.

Regulation of illegal sales of fish Among the most aggravating problems of present policy is the control of illegal sales of fish caught in the Indian fishery. This practice is by no means universal, but it is common in certain areas, and causes much of the criticism from outside observers. The measures taken to control it are irritating to innocent Indians, and it presents an exceedingly difficult enforcement problem for the authorities. As salmon has increased in value, the incentives for illegal sales have increased correspondingly, and it is believed that non-Indians are also involved in "bootlegging" substantial quantities of fish taken in up-river Indian fisheries.

These problems would disappear if the restrictions on Indian sales of fish were abolished, but this could be done only in conjunction with the adoption of catch limits. The purpose in prohibiting sales is to prevent Indians from taking more fish than they need for food. But the fundamental concern is, or should be, to keep their harvest of fish to a level that bears some relation to traditional usage; what they do with the fish is a secondary matter. The requirement that they eat whatever they catch is not justified by tradition nor is it likely to always ensure that they gain the highest possible value from the fish they are permitted to take. But under present arrangements, which provide no other limit on the Indian catch apart from three day openings, the prohibition on selling fish is the only control available.

Many Indians resent the prohibition on sales of fish as a denial of their historical practices. In the words of one northern group,

The idea that the inland (sic) Indian fisheries should be for subsistence only was first introduced to this area in the B.C. Fishery Regulations, November 1888. Up to that time, and indeed after, it was considered legitimate for an Indian fisherman to trade or sell any of his catch that was surplus to the needs of his family.¹⁸

The desirability of permitting sales of fish caught in the Indian fishery is debated among Indian groups themselves. Those on the Skeena and Fraser typically support legalization of sales, while those of the Nass valley generally oppose it. But all advocate inland commercial fisheries as a means of economic development.

It has been suggested in Commission hearings that if the quantity of fish to be taken by an Indian band were agreed upon, and the regulations about what may be done with the fish after they were caught were abolished altogether, several significant advantages would result. First, it would restore traditional opportunities to sell or trade fish. Second, it would enable the Indians to obtain the highest possible value from the fish they catch, whether by selling or consuming them. Third, it would facilitate management by specifying the quantities of fish to be made available for the Indian fishery. And most importantly, it would alleviate an aggravating enforcement problem.

The idea of a specified quota is resisted by some Indian groups because they see it as a further restriction on their fishing opportunities. While this is an understandable reaction, it is not necessarily justified. Whether it is depends on the level of the permitted catch. If it were equal to, or greater than, the amounts that would be taken under existing arrangements, and the restrictions on the use of the catch were abolished, the Indians could expect to gain significantly increased benefits from their fishing rights.

Other enforcement issues Apart from effort to control sales of fish, the Indian fishery has a disturbing history of abrasive relations between the Department and Indians over enforcement of regulations concerning fishing times, places and other matters. Many Indians find these regulations offensive in principle, others maintain that they are arbitrarily imposed, and many breaches appear to reflect misunderstandings. In the course of the public hearings and meetings with Indians, I heard of incident after incident in which gear or fish have been destroyed or confiscated and arrests made that have left Indians bewildered or outraged and have often had severe economic consequences for them. These measures are often interpreted as harassment by Indian people;

... Indian people [have] experienced harassment, intimidation, unjustified confiscation of fish, cars and gear, unnecessary and fruitless court action pursued at great expense by Fisheries personnel, constantly using emotionally loaded terms as "massive poaching", "illegal possession", etc.¹⁹

For enforcement officers, too, the present arrangements often pose very difficult problems. The Indian fishery calls for understanding and sensitive application of the law, but there is heavy pressure from others for close surveillance of highly visible Indian fishing. Fear and hostility is sometimes the result of misunderstanding of the duties of enforcement officers and the purpose of regulation. Moreover, the system now necessitates tight controls on fishing activity, in some places at least.

Several possibilities exist for alleviating these strains. To the extent that responsibility for administering and policing Indian fishing can be delegated to band councils (as discussed above), the problem of communicating the rules to Indian fishermen will almost certainly be alleviated and friction with the Department reduced. Improvements in consultative arrangements with the Indians (discussed below), would also tend to improve understanding and cooperation. And the introduction of a quota system might permit relaxation of some of the restrictions on fishing methods and times.

Commercialization of minor fisheries Many Indians have expressed anxiety about growing pressure to initiate commercial exploitation of certain minor marine species that they have traditionally relied on. They are particularly apprehensive about eulachon. This fish, which has such a special place in Indian food and traditions, is not now harvested commercially, but there are recurrent rumours of a potential market for eulachon and so of its being exploited commercially. Indians are concerned that commercial harvests of the relatively small stocks of this species would soon impinge on their traditional supplies. Similar concerns are felt about licensing commercial harvests of certain types of seaweed that are traditional foods among some coastal bands, and of minor shellfish species. Many argue that the commercial abalone fishery has already interfered with a traditional food source.

The priority of the Indian fishery requires that special caution be used when creating new commercial fisheries based on minor species traditionally used by Indians. Decisions regarding commercial exploitation should be based on thorough assessments of available stocks, their productivity, and the requirements of the Indian fishery.

Consultation A recurrent criticism by Indians is that the Department fails to consult them in formulating regulations for their fishing activity and that this results in difficulties relating to their customary fishing practices. They also claim that their local knowledge is ignored and that they have little opportunity to contribute to fisheries management.

In response to these concerns, the Department has made a number of informal arrangements to improve its communications with those involved in the Indian fishery: many fisheries officers consult with and seek the advice of local Indians; the Department has recently appointed, at the regional level, an Indian liaison to improve communication

with Indian people; regular discussions are held with the bands along the Skeena River, through the Skeena River Management Committee, which help the Department determine the escapement required from the commercial fishery to supply the Indian food fishery as well as to provide for adequate spawning; and both the Department of Indian and Northern Affairs and the Department of Fisheries and Oceans have held frequent meetings with Indian groups in the Pacific Region and in Ottawa to confer on Indian fishery issues.

It has been suggested that more formal consultative structures would be helpful to both Indian bands and the Department. One proposal calls for a representative Indian Fisheries Board that would develop and implement a "co-management strategy" to regulate the fishery and investigate new opportunities for Indians.²⁰ Another suggests a board be established that would allow representatives of all the bands on the Fraser River system to coordinate their needs in consultation with the Department and to participate directly in management and enhancement.²¹

The fisheries would probably benefit from consultative arrangements that enabled Indians to negotiate their fish requirements with the Department and to participate constructively in resource management and regulation. This would be particularly true for large up-river fisheries, which are subject to many demands and which require exacting

conservation measures. Such arrangements would undoubtedly improve relations with Indians, encourage self-regulation by Indian bands, and provide them with more meaningful participation in fisheries management. It would also enable the Department to identify more accurately the quantitative needs of the Indian fishery.

Concluding Observations

It deserves to be re-emphasized that the present policies governing the Indian fishery work satisfactorily in some areas. These arrangements vary, but so do the circumstances of different Indian communities and the pressures on the resource base. Nevertheless, the history of relations between Indians and the government over the Indian fishery is conspicuous for its adversarial climate.

Better arrangements are clearly required if increasing friction and confrontation are to be avoided in some areas. Moreover, changes are needed to allow Indians to exercise their legitimate rights without increasing criticism and pressure from others and the disproportionate demands that this activity now puts on the Department. But changes must be made carefully and implemented gradually and flexibly. I perceive that the Indian leaders who are most dissatisfied with present arrangements are prepared to discuss alternatives in a cooperative spirit, and I hope that, before I write my final report, we will be able to identify avenues of constructive reform.

FOOTNOTES

1. Mr. Godfrey Kelly in testimony before the West Coast Oil Ports Inquiry, cited in Exhibit # 133, p. 7-8.
2. The term "Indian food fishery" is criticized by many Indians on the grounds that it implies a traditional dependence on fish for direct consumption only. Historically, fish were important commodities of trade and barter as well.
3. G.W. Hewes, Indian fisheries productivity in pre-contact times in the Pacific salmon area, Northwest Anthropological Research Notes, (Volume 7), 1973.
4. Exhibit # 141a, p. iv.
5. W. McKay, The Native Food Fishery and the Potential Impacts of Oil Spills. A report prepared for the West Coast Oil Ports Inquiry. Vancouver, 1978.
6. Because of the lack of a consistent system of data collection, catches and trends are very uncertain. Some of the increase suggested by these figures may be due simply to improvements in reporting. The figures cited were provided in "Native Fisheries," a background paper prepared for this Commission by the Department of Fisheries and Oceans. August 1981.
7. Marilyn G. Bennett, Indian Fishing and its Cultural Importance in the Fraser River System. A report prepared for the Union of B.C. Indian Chiefs and the Fisheries and Marine Service. Vancouver, 1973.
8. W.F. Sinclair, The Economic and Social Impact of the Kemano II Hydroelectric Project on British Columbia Fisheries Resources, (Vol. II). A report prepared for the Fisheries and Marine Service. Vancouver, 1976.
9. Edwin, Reid and Associates Ltd., Working Paper on Indian Food Fisheries and Salmonid Enhancement. A report prepared for the Department of Fisheries and Oceans. Vancouver, 1979.
10. Sinclair, The Economic and Social Impact of the Kemano II.
11. Exhibit, # 129 p. 4.
12. Edwin, Reid and Associates Ltd., Working Paper on Indian Food Fisheries.
13. British Columbia Fisheries Regulations, November 26, 1888.
14. "Native Fisheries," a background paper prepared for this Commission by the Department of Fisheries and Oceans. August 1981. p. 7.
15. The Supreme Court of Canada has acknowledged that such legislation could impinge on previously guaranteed treaty rights in R. v. Sikyea, [1964] 2 C.C.C. 325, Affirmed [1964] S.C.R. 642, [1965] 2 C.C.C. 129, 50 D.L.R. (2d) 8.
16. Exhibit # 133, p. 2, 4.
17. Exhibit # 106, Part III, p. 2.
18. Exhibit # 52, p. 26-27.
19. Exhibit # 133, p. 18.
20. Exhibit # 133.
21. Supplementary Document (Nicola Valley Area Council).

CHAPTER 9

The Sport Fishery

"...regulation is gain rather than loss. The resource is put in proper perspective, as something of immense value, to be cherished, used respectfully and passed on unimpaired to future generations. True, management also brings about some loss of wild freedoms and in some sense a loss of quality; but these are penalties of increasing population This is not a restriction, but a challenge ..."

RODERICK HAIG-BROWN¹

The salmon and trout of the Pacific coast provide superb sportfishing opportunities. These highly prized game fish, along with the natural beauty and other features of this region, attract sportsmen from many parts of the world. In addition, sportfishing is an important recreational activity for hundreds of thousands of Canadians, many of whom have made it an important part of their lives.

An unusually wide variety of sportfishing experiences is available, from trophy fishing for the impressive chinook salmon and the first-rate experience of river fishing for steelhead to the casual dangling of a line as an excuse to be outdoors. A good deal of commercial activity is now based on sportfishing. All are part of the sportfishery, and all have been growing rapidly.

Moreover, because of its variety and prevalence, it has a significant impact on certain stocks of fish, especially some runs of salmon and steelhead and cutthroat trout.

With such wide social significance, economic value and impact on resources, the sportfishery cannot be regarded as trivial, as it has sometimes in the past. The legitimacy of this form of resource use and its importance must be recognized and incorporated into fisheries policy; this has been made clear in the extensive discussion of sportfishing problems in my public hearings and meetings. Discussion of this subject is hampered, however, by a great deal of confusion and uncertainty about the dimensions of sportfishing. For this reason I have made a special effort, with the help of staff researchers and published studies as well as participants and their submissions, to identify the scope of this fishery and its implications for management.

The available statistical base for assessing the tidal water sportfishery is very weak. There are no consistent or comprehensive data regarding numbers of saltwater sportfishermen or their catch. A diverse collection of studies provide useful information, but they typically relate to particular areas and particular years, and depend on sampling techniques that yield widely varying results. All this inhibits informed discussion.

This year for the first time, following recommendations made to the Minister last fall, sportfishermen in tidal waters require a license.² This should provide some information about numbers of sportfishermen and related studies now under way should provide more reliable estimates of catch and other data. I therefore hope to have much more reliable information for the final report of this Commission. This chapter attempts to interpret the sketchy information currently available to provide for more informed discussion in the meantime.

Sportfishing Activity

Tidal water sportfishermen in 1980 numbered about 400,000.³ Their total angling effort is estimated at 2.5 million angler days, an average of six days per angler. As Table 9-1 shows, about sixty-three percent of the sportfishermen were residents of British Columbia; they fished an average of about 8.5 days and accounted for eighty-four percent of the total effort. Other Canadians represented 9.5 percent of the total number; and foreigners, 27.5 percent. The latter fished an average of only 2.7 days each.

Table 9-1 Estimates of numbers of anglers and angling effort in tidal waters in 1980

	anglers		angler-days	
	thousands of fishermen	percent of total	thousands of days	percent of total
residents of B.C.	252	63	2,100	84
other Canadians	38	9.5	100	4
foreigners	110	27.5	300	12
Total	400	100	2,500	100

Sources: W.D. Masse, "Questions and Answers on the New Sport Fishing Regulations," Department of Fisheries and Oceans, Vancouver 1981; and P.F. Loftus and W.D. Masse, *Impact of S.E.P. and S.E.P. Cost Recovery on British Columbia Sport Fisheries*, Department of Fisheries and Oceans, Vancouver, 1979. The figures presented above were calculated by multiplying the percentage distribution of angler participation and effort by residency in the second publication by the total number of anglers and angler days estimated by Masse and presented in the first document.

Tidal water sportfishing is concentrated in the summer months of July to September. Nearly sixty percent of the fishing by Canadian sportsmen and more than eighty percent of that by foreigners takes place during this three-month period, although there is a growing winter fishery, particularly around Victoria.⁴

Much better information is available for freshwater sportfishing in British Columbia because of the longstanding system of licensing freshwater sportfishermen. Some 430,000

licenses were purchased in 1980.⁵ While this reflects an increase of about 150 percent over the last twenty years, it is probably less than the corresponding increase in saltwater fishermen. Freshwater sportfishermen fish for a wide variety of species, but about eight percent of their catch is made up of salmon, steelhead and cutthroat trout, which are fished in tidal waters as well.⁶ Three-quarters of the freshwater anglers in 1980 were B.C. residents, with other Canadians and non-Canadians each comprising twelve percent of the total. Resident British Columbians fished an average of 13.5 days per year. Other Canadians averaged 6.4 days, while non-Canadians averaged only four days. Over ninety percent of the total number of days spent sportfishing in fresh water was accounted for by residents of British Columbia.⁷

Economic Dimensions of the Sportfishery

Sportfishing now generates substantial economic activity. The capital value of boats used in sportfishing is probably in the same order as the value of the commercial fleet. In 1979, in Georgia Strait alone, there were an estimated 108 thousand boats used in tidal waters with a capital value of more than \$600 million.⁸ A number of investigations have attempted to assess the importance of fishing as the motivation for boat ownership and acquisition and although interpretation of the results is difficult, fishing is apparently the dominant motive for acquiring pleasure boats.⁹ The proportion of boat purchases that would not have been made in the absence of fishing opportunities, is estimated to be over half.¹⁰

According to a 1972 survey, about half of all resident Canadian sportfishermen in British Columbia fish from their own boats, another third fish from boats of friends and relatives, and the remainder from rented boats or from shore.¹¹ Available evidence indicates that their average incomes are well above those for residents of British Columbia as a whole.¹²

Preliminary data suggest that in 1980 the total expenditure on goods and services directly related to sportfishing in tidal waters was in the neighborhood of \$80 million, though this estimate excludes some indirect spending.¹³ This figure is roughly confirmed by a consultant's study conducted earlier this year.¹⁴

Most of the firms that supply the goods and services purchased by sport fishermen are locally based. Many goods are manufactured locally, as well. The tackle and sportfishing equipment manufacturing industry has developed along the lines of a "cottage industry," especially in the Victoria region. These manufacturers now supply most of the local market with lures and tackle and have expanded as well into foreign markets. This small, innovative industry has demonstrated remarkable entrepreneurial skill. The consultant's study referred to above reports total sales of about \$2 million for the five major manufacturers included in the survey. Information presented at public hearings indicates that sales by tackle manufacturers in B.C. total in the order of \$5 million.¹⁵

The Sport Catch

For purposes of resource management, the most important implication of sportfishing is its impact on the stocks. Sportfishing on the Pacific coast is directed overwhelmingly toward salmon, mainly chinook and coho, although a wide variety of other species are taken in smaller numbers by recreational fishermen.

A great deal of controversy and confusion surrounds the statistics on the sport catch because of the paucity of reliable data. Until 1976 the Department compiled statistics annually on the sport catch, but these were so unreliable that compilation was discontinued.¹⁶ Since then, varying estimates have been given by a number of surveys and studies.¹⁷ This uncertainty has generated a great deal of skepticism among sportfishermen about the reliability of the published information, as indicated repeatedly by submissions to this Commission.

The latest estimate provided to the Commission by the Department put the tidal sport catch of chinook salmon in recent years at between 400,000 and 700,000, and that of coho between 700,000 and 900,000.¹⁸ These ranges, compared with the commercial catches of these species, suggest that sportfishermen take twenty-three to thirty-five percent of the chinook catch and sixteen to twenty percent of the coho, as shown in Table 9-2. Aggregating the catch of all five species of salmon and steelhead in the commercial and sports fisheries (including steelhead caught incidentally in the commercial fishery and some 70,000 pinks and 20,000 steelhead taken by anglers), these estimates suggest that sportsmen account for five to seven percent of the total.

Table 9-2 The share of the catch of salmon taken by tidal sportfishermen.

	chinook		coho		all salmon and steelhead	
	fish 1000's	% of total catch	fish 1000's	% of total catch	fish 1000's	% of total catch
Georgia and Juan de Fuca Straits ^a						
low estimate	360	70	630	85	n.a.	n.a.
high estimate	630	80	810	90	n.a.	n.a.
total coast						
low estimate	400	23	700	16	1190 ^b	5.0
high estimate	700	35	900	20	1690 ^b	6.9

Source: Annual Summary of British Columbia Catch Statistics, 1979. Department of Fisheries and Oceans. Vancouver, 1980; and "Recreational Fisheries," a background paper presented to the Commission by the Department of Fisheries and Oceans, August 1981.

^a Areas 13 to 20, 28, 29 A, B and C. These areas are the source of an estimated ninety percent of the coastwide sports catch.

^b Includes seventy thousand pinks and twenty thousand steelhead.

Most of the sport catch, probably ninety percent, is taken in the relatively sheltered waters of Georgia and Juan de Fuca Straits, close to the major population centres.¹⁹ Here, sportfishermen take the largest proportion of the chinook and coho salmon catch. According to rough calculations

based on the Department's estimates, the sportfishery accounts for seventy to eighty percent of the total chinook catch in these areas and eighty-five to ninety percent of the coho.

The total freshwater catch of all fish remained stable at eight million pieces between 1960 and 1980; but the catch has been distributed among more anglers, primarily Canadians, and the average catch per angler-day fell by half from 3.8 in 1960 to 1.6 in 1980.²⁰ In 1975, the non-tidal catch of salmon by sportfishermen was estimated at 39,000 chinook and 52,000 coho.²¹ In contrast to other forms of sportfishing, the highly prized steelhead fishery has been declining for some time. For the 1976-77 season, the steelhead catch was estimated at 20,168 fish, having declined at a compounded rate of 6.4 percent per year over the preceding decade. Over the same period, the number of steelhead fishermen fell at an average annual rate of 3.2 percent.²²

The catch rate of saltwater sportfishermen is not, on average, very high, and is often exaggerated. The estimates presented above suggest that even with the "high" catch estimate of 1.6 million fish, if tidal anglers number something in the order of 400,000, they catch only about four fish each per year. The estimate of a total of 2.5 million angler-days in Table 9-1 implies less than one fish caught per angler-day.

However, the catch is distributed very unevenly among sportfishermen. The vast majority catch very little; their many hours on the water yield very few fish, though undoubtedly a great deal of relaxation and pleasure. A small number of keen sportsmen, who take great satisfaction in developing their skills, fish more frequently and usually enjoy much greater success. Not all of these experts take large numbers of fish, however. Many avid sportsmen restrict themselves to esoteric fishing methods and gear, and they often release fish.

At the other extreme is a group sometimes referred to as "fish hogs" or "meat fishermen". Some of these are simply avid fishermen, conspicuous in their local areas because they catch a great many fish. Others are considered greedy and many are suspected of disregarding regulations. They attract the contempt of commercial fishermen and sportfishermen alike. Although this group is very small, they probably have a significant impact on the resource in certain areas.

Developments in Sportfishing Regulation

Sportfishing in tidal waters has been subjected to increasingly stringent regulation during the post-war period. A daily bag limit of ten salmon was introduced in 1951; this was reduced to eight in 1959 and four in 1963. The minimum size required for keeping salmon was increased from eight inches in 1951 to twelve inches in 1965 and to eighteen inches for chinook in 1981. There have also been additional restrictions on gear and areas in which sportfishing is permitted.

This year, major, new restrictions on sportfishing were imposed. Most important was the new tidal-water

sportfishing license, ending more than a decade of discussions, proposals and debate about licensing. The purposes of licensing are two-fold: to provide information about sportfishing for resource managers and to raise revenue from sportfishing for resource enhancement.

The license is required of all fishermen over fourteen years of age who fish for fin-fish for sport in tidal waters. The fee for residents of Canada is five dollars and for non-residents twenty dollars. A three-day license is also provided for non-residents at ten dollars, and a one-day license for residents and non-residents at \$3.50. The Department has estimated that these licenses will yield something in the order of \$2.9 million in 1981, and the cost of administering the system is expected to be \$982 thousand.²³

Other regulations introduced this year were designed to reduce the fishing pressure on certain stocks, and specifically to increase escapements of chinook salmon in Georgia Strait and the Fraser River. These were hotly debated, but equally controversial was the way in which they were introduced. On February eleventh the Department announced, in the context of its urgent concern for conservation of declining chinook salmon and new restrictions on commercial trolling, reduced bag limits for chinook salmon everywhere on the coast, a winter closure on sportfishing for this species, closure of the Fraser River to chinook sportfishing, a ban on the use of downriggers, and increased minimum size limits for chinook salmon.

Sportfishermen and those with commercial sportfishing interests strenuously opposed these changes and, through the Sport Fish Advisory Board, proposed an alternative seven-point plan, which they maintained would make the same contribution to chinook escapement with less adverse impact on sportfishing opportunities and on supporting industries. A moratorium was put on the announced changes (except for the prohibition on downriggers and the Fraser River closure) while the counterproposal was discussed. The latter was subsequently adopted.

The new regulations include a minimum size limit of eighteen inches for chinook salmon, a daily bag limit of two chinook salmon during the winter period from December 1 to March 31, maintenance of a closed area at the mouth of the Fraser River and a prohibition on downriggers that are not equipped with quick-release devices. In addition, a seasonal bag limit of thirty chinook salmon is proposed for 1982.

Several significant conclusions can be drawn from this year's experience with sportfishing policy changes. First, although spokesmen for sportfishermen and commercial sportfishing interests have argued strongly and consistently at my public hearings for a larger share of the salmon catch, they nevertheless acknowledged the need for additional restraints to conserve stocks of chinook and were generally willing to contribute to a conservation program. However, their willingness to accept the controls adopted must be considered in the context of announced measures that would have had much more severe impact on them.

Second, the policy changes were announced only shortly before the heavy sportfishing season began. This, coupled with the nature of the proposals, had impacts on supporting industries that were almost certainly not fully foreseen. Manufacturers and retailers of downriggers suddenly found themselves with inventories for which there was no market. And as the word spread in Canada and abroad that only one chinook per day could be caught here, resort owners, charterboat operators and guides were faced with a flood of cancelled bookings. The regulations that were ultimately adopted were much less disruptive, but the effects of the earlier announcement were not completely alleviated. This has given rise to serious criticism of the consultative arrangements for sportfishing regulations.

Third, the changes proposed and implemented provided a vivid illustration of the weakness of applying regulations to the whole coast, to deal with problems specific to regions or stocks. The new restrictions were motivated by the need to protect escapement of Georgia Strait chinook salmon, particularly the stocks that run to the Fraser River. They did not threaten to impinge heavily in many parts of the coast where sportfishing depends mainly on coho, and they could not be equally justified where it depends on other chinook stocks. However, their full brunt would be felt in the major sportfishery off Victoria in the Strait of Juan de Fuca, which depends largely on chinook salmon, though the stocks fished there migrate mainly to rivers and hatcheries in the United States.

Finally, the events demonstrated that representatives of sportfishing interests were able to design alternatives which, according to both them and the Department, could achieve the desired results with less adverse impact on sportfishing opportunities.

Sportfishing Values and Opportunities

There are two fundamental questions that must be dealt with in sportfishing policy: how much of the catch should be allocated to sportfishermen, and how this share should be allocated among sportfishermen. The answers to these questions must be consistent with this Commission's terms of reference, which specify that the general objective is to ensure

that fish resources and their use make their highest possible contribution to the economic and social development of the people of Canada, especially of those resident on the Pacific coast of Canada, recognizing that this contribution may be realized in economic, recreational and other social forms; . . .

This implies that, whatever the magnitude of the catch available to sportfishermen, the policy governing its use must be designed to ensure that it will generate the maximum possible benefits. This, in turn, raises the question of what those benefits consist of. This basic question seems to be the source of some confusion, and since prescriptions of appropriate policies hinge on this matter, it deserves brief clarification.

It can be stated unequivocally that the value generated by sportfishing cannot be measured simply by determining the value of the fish caught. While this is a relevant measure of the values generated by the commercial fishery, it is only incidental to the value of sportfishing, which is derived primarily from the recreational experience associated with fishing. The quality of this recreational experience is undoubtedly affected by the opportunity to enjoy a good catch, but it is this fishing opportunity, not the value of the product, that excites most sportfishermen. This explains why most sportfishermen spend far more on fishing equipment, supplies and services than it would cost to purchase their catch on the market, and why many enjoy fishing even though they don't catch fish or don't take them home to eat.

Nor can the benefits of sportfishing be measured accurately by calculating expenditures on fishing equipment and services. To do so is to confuse benefits with costs. A sportsman will go fishing only if he expects that his enjoyment will be worth more to him than the outlays he must incur to fish. The net benefit is, therefore, the excess of this recreational value over his costs.

While expenditures on boats and other goods and services indicate the amount of economic activity generated by the sport, they cannot be considered a net economic gain for the following reason. If sportfishing opportunities were absent, people would spend their money on other recreational pursuits and on other goods and services; so other kinds of economic activity would be generated, and the ultimate impact on the national income would be about the same.

In short, we must look to the value of the recreational experience in assessing the benefits of sportfishing. Many factors contribute to this value. As one brief put it,

. . . if the salmon is the key or the axel of the wheel, perhaps the other factors, [fraternity, the desire to become a better fisherman, the competitive aspect and the opportunity to get away from job pressures, family commitments and social obligations] are the spokes and rim of the wheel which turns the motivational crank — giving us a more complete picture of what sportfishing is and what it means to the people that participate in it.²⁴

Recognition of the factors that affect the quality of the fishing opportunity is crucial in designing sportfishing policy, since it is the quality of the fishing opportunity that governs the value of it. Many of these factors are beyond the scope of fisheries managers, who obviously have little influence on the comradeship, weather, scenery and so on. But the fisheries authorities have in their hands the essential key to an exciting recreational experience: they regulate the opportunity to catch fish; and by fixing bag limits and making other rules, they control whether a sportfishermen can, with a little luck, a little skill, and some dedicated effort, take a satisfying catch.

The essential motives in sport fishing are hope and the gamble. The hope is that a day on the

water will produce a few nice fish. Time and money are spent for this gamble. The sure way to kill the urge to go sport fishing is to remove these two motives A fishermen will go out day after day and not catch a single fish. If he is told he can only go out and catch one fish, and can't even use his favourite tackle, then the hope and fun of the gamble is removed and he ceases to want to go fishing.²⁵

The value of a sportfishing opportunity can, theoretically, be measured by determining the maximum amount fishermen would pay for the opportunity.

Studies conducted in British Columbia, Washington and Oregon indicate that the average sportfishermen would be prepared to pay fifteen dollars per day for the opportunity to participate in general saltwater fishing, and twenty-five dollars for trophy saltwater sportfishing and for steelhead freshwater angling.²⁶ These are crude estimates, and they were made in 1977, but they indicate the appropriate kind of measure for determining the value of sportfishing. If the fifteen dollar per day figure were applicable to saltwater sportfishing in 1980, the aggregate value generated by sportfishing in tidal waters would have been in the order of \$375 million.

Canadian governments have obviously chosen not to charge the maximum that the market would bear, thus the benefits accrue, for the most part, to the anglers themselves rather than to the resource-owners (the people of Canada) generally. This policy can be defended on socio-political grounds, but it has the incidental effect of leaving no direct economic indicators of the values generated. This can be estimated only from indirect evidence.

Regulatory policies should therefore be considered in terms of whether they will increase or diminish the value of the recreational experiences provided. The basic choice is between spreading the available catch among more fishermen, which enables a greater number to participate but reduces the quality of the experience for each, and controlling the numbers so that each can enjoy a more valuable fishing opportunity.

Historically, we have chosen the former; sportfishing has been freely accessible to everyone, with the catch being controlled by progressively reducing the numbers of fish that each may retain, and by gear restrictions and closures. These controls have been advocated because they do not limit the number of fishermen who may participate. But as long as the number of potential sportfishermen continues to grow, this policy implies progressive deterioration in opportunities and hence deterioration in the aggregate value generated by sportfishing. Judging from reactions, this point appears to have been reached with the proposal this year to reduce the bag limit for chinook salmon to one fish.

The alternative approach is to preserve the opportunity to take a satisfying catch, thereby maintaining the value of the recreational experience, and to control the total pressure on

the stocks by regulating the number of fishermen. One way to control numbers is by raising the price of a fishing license. A modest license fee would deter those potential anglers who put only a marginal value on the sport, and a very high fee would undoubtedly reduce participation considerably. This price-rationing approach affords an attractive means of preserving the quality of sportfishing opportunities in the face of limited resources and increasing demands on them. It would also increase public revenues from sportfishing and bring the charge for sport fishing more in line with its value.

Some people object to the idea of higher charges for sportfishing privileges on grounds that they impinge most heavily on the poor. This is a worthy concern, and it is for this reason that special rates are often provided in licensing systems for old-age pensioners and others. However, saltwater sportfishermen generally have higher than average incomes and their other expenditures on the sport are substantial. It is apparent, also, that the sportfishing opportunities on the Pacific coast are among the most attractive in the world and the fish that this activity depends on are exceptionally valuable as well. Many people consider it appropriate for those who use them to pay for the privilege.

Of course, numbers of fishermen could be restricted by other methods. More stringent eligibility criteria based on residency and age could be introduced, or privileges could be determined by drawing lots. In comparison with simply raising the price of licenses, this has at least three disadvantages. First, it does not ensure that those who obtain fishing privileges are those who put the highest value on them; second, it will not generate as much revenue; and third, it requires governments to determine who should have the right to fish in an inevitably arbitrary way.

Various combinations and modifications of these approaches are possible. License fees could be held low, but a charge levied per fish through a tag or punchcard system. This would have the advantages of minimizing financial barriers to sportfishing while charging according to the individual's demands on the resource. The higher the charge per fish, the less the need for bag limits to restrict the catch. Or the license could include the right to a modest number of fish without extra charge while additional tags could be available at a price.

Any restriction on access to sportfishing is objectionable to some sportfishermen who believe that sportfishing should be freely available to everyone. Unfortunately, the combined demands on our fish stocks are such that controls on catches are essential if they are to be protected from depletion. The need to restrict sportfishermen could be reduced by resource enhancement or by reducing the commercial catch, but otherwise their catch must be regulated. This can be done either by progressively reducing the catch of each sportfisherman or by reducing the numbers who fish. In the commercial fishery, which faces a parallel problem, emphasis has recently shifted from the former to the latter approach, as explained in Chapter 5. I do not think that discussion has focused adequately on this choice for the

sportfishery. The main alternatives are sketched above, and this Commission must choose among them, or variants of them, with a view toward ensuring that the recreational values that the resource can generate will be maximized.

The other fundamental question for sportfishing policy, referred to above, is how much of the available catch should be allocated to the sportfishery rather than to the Indian or commercial fisheries. In principle, the answer is clear enough; so long as the basic objective is to ensure that the resources are utilized in the most valuable way, more should be allocated to that sector where the additional fish would generate more value. The difficulty in applying this rule lies in the fact that the values generated in each sector are different and so not directly comparable: the value generated in the commercial fishery is measured in terms of market value; the value in the sportfishery lies in the recreational enjoyment; and the value in the Indian fishery lies in much more profound social considerations. To complicate matters, all these values can be expected to change over time and relative values vary widely among stocks and location.

For these reasons it is difficult to generalize on this matter. Some comparisons, however, are fairly obvious; a steelhead caught in the commercial fishery may have a gross value of twenty dollars. This same fish, left to river sportfishermen, would have a much greater value because it would provide several days of highly prized recreational activity. This picture is complicated, though, by the fact that fish caught by sportfishermen yield diminishing returns; sportsmen get great satisfaction from catching a few fish, but anything beyond one or two dozen in a season is likely to add much less to the value of the sportfishing opportunity for most recreational fishermen.

Obviously, the problem of assessing the values that fish generate is extremely difficult. Ultimately, the allocation must rest heavily on subjective judgements about the relative benefits of utilizing resources in the various ways.

Special Issues

A number of particular problems relating to the management and regulation of sportfishing have been raised at the public hearings and deserve brief mention here. They will be dealt with fully in my final report.

Sportfishing by foreigners Foreign sportsmen support many resorts and charter boat operations and generate considerable amounts of income and employment, particularly in areas that offer specialized sportfishing. However, the benefits to the people of Canada from sportfishing by foreigners are almost entirely economic (in contrast to fishing by Canadians where the benefits of recreational enjoyment accrue to Canadians whether they are paid for or not), and, for this reason, higher charges to foreigners, as is now the practice, is justified.

Judging from the apparent willingness of some foreign sportfishermen to pay to fish on this coast, it seems likely that Canadians can benefit by allocating at least some fish to this purpose. It is difficult to conclude, as some have

argued, that Canadians would be better off by excluding foreign sportfishermen entirely. The problem is how to determine the level of charges for fishing privileges that will yield the maximum economic gain to Canadians, taking into account all the benefits and costs associated with this activity including the value of the fish taken by foreign sportfishermen.

River versus ocean fishing The apparently disproportionate restrictions placed on freshwater fishing as opposed to ocean fishing for the same fish was an issue raised in a number of submissions. Closures to sportfishing for chinook salmon in major parts of the Skeena and Fraser River systems, for example, have completely eliminated this sportfishing opportunity in these areas. Sportfishing for pink, chum and sockeye salmon is prohibited in all non-tidal waters. It has been suggested that the prohibitions on freshwater salmon fishing prevent advantage being taken of the potentially constructive interest of sportfishermen.

The freshwater angler given his rightful opportunity to fish for all salmon will provide an army of river guardians which will ensure preservation of the stream environment and the stocks.²⁷

While there may be special biological reasons for restricting fishing in certain areas, it is not obvious why sportfishermen generally should be subject to more restrictions when the fish they seek are further along their migratory routes. Indeed, the rarer and more highly sought-after experience of river fishing for salmon and steelhead may well generate more recreational value than the same fish caught at sea.

Regional regulation Most tidal sportfishing regulations apply uniformly over the whole coast in spite of widely varying stock conditions and sportfishing pressure. As noted earlier, the regulatory changes this spring, aimed specifically at increasing the escapement of chinook salmon in Georgia Strait and the Fraser River, bore inappropriately on sportfisheries in other areas. In view of the diversity of conditions over the Pacific coast, controls should vary to suit specific areas and to provide a diversity of sportfishing opportunities. In short, "Blanket regulations that apply to the entire coast are fast becoming obsolete."²⁸ Moreover, as management requirements become more rigorous, the need for more discriminating regional regulations that deal with problems of particular areas and stocks will become increasingly urgent. In addition, regionally specific regulations might redirect broad patterns of sportfishing activity by providing more attractive opportunities in areas of the coast where there is less pressure on the stocks.

Bag limits I have already emphasized the basic choice between controls on the number of sportfishermen and limits on the catch of each. At present, sportfishermen are subject to a daily bag limit of four salmon, only two of which may be chinook during the winter. A seasonal bag limit of thirty chinook is also being considered.

Daily and seasonal limits are to some extent alternatives, but affect fishermen differently. If forced to choose, very

active anglers would favour daily limits since that would constrain their seasonal fishing opportunities the least. But less active anglers would likely prefer a seasonal limit, particularly if it were anything like thirty salmon since this would have little impact on their catch. Occasional fishermen, and people who cater to visiting sportsmen, prefer either seasonal limits or generous daily bag limits to ensure a rich fishing experience. The aborted limit of one chinook per day was vigorously opposed by resort and marina operators for this reason.

A seasonal limit can be implemented by means of tags or punchcards. Punchcards, such as those used by the Province in regulating steelhead fishing, are less expensive and simpler to administer, but they are less flexible and more difficult to enforce. Tags have been used extensively in British Columbia for regulating bag limits for game. Attaching tags to each fish has the great advantage of visibility; any observer can immediately recognize illegal fish, which is a strong deterrent to abuse. Tags can also be sold individually.

The amount paid by a sportsman is then related to his demands on the resource, and there can be less dependence on bag limits. An attractive compromise arrangement, mentioned earlier, is a modest number of tags issued with each fishing license, with additional tags available at some significant price. Any of these alternatives would preserve potential sportfishing opportunities more than low across-the-board daily limits, and would significantly improve statistical information on sportfishing as well.

Size restrictions For many years sportfishermen have been required to release small fish in order to prevent mortality of juveniles. At present, they are only permitted to retain chinook longer than eighteen inches, and other species of salmon longer than twelve inches.

Strong arguments have been presented to the Commission for eliminating these restrictions in favour of a rule requiring that all fish taken out of the water be retained and included in the fisherman's bag limit, or alternatively no rule at all so that any fish could be retained or released. Evidence suggests that mortality is high among small fish released, especially when inexperienced fishermen handle fish to remove the hooks. This being so, retention of any fish caught, it is argued, would advance conservation by including more of the fish hooked within the angler's bag limit.

It is pointed out, also, that catching even a small fish is a rewarding experience for some people, especially children. And since it makes relatively little difference to the stock whether a fish taken is big or small, recreational opportunities can be enriched by abolishing size limits.

Consultative arrangements The Commission has received a great deal of commentary about arrangements for consultation between the Department and sportfishing interests, much of it highly critical. Sportfishermen maintain that they, and those with commercial sportfishing interests, could

assist the Department in designing regulatory policies and that they are willing to do so. Certainly, those that have presented briefs to this Commission appear to be well-organized and well-informed about management problems and about local conditions.

Sportfishing interests generally perceive the existing consultative arrangements, especially the Sport Fish Advisory Board, as inadequate and ineffective. Furthermore, the Department itself has expressed dissatisfaction with the arrangements. I have received a variety of proposals for improving the existing Board as well as suggestions for alternative structures, some of which would function at the regional or local levels. In addition, I have received interesting suggestions for involving sportfishing groups in regulating sportfishing in local areas and in collecting catch information.

Certainly there is now a serious deficiency of reliable data about sportfishing and the sport catch, and any proposal for enlisting the cooperation of sportfishermen in obtaining information deserves to be explored. The importance of dependable statistical information to support sportfishing regulations was stressed repeatedly at my public hearings.

Fisheries will require the absolute cooperation from the recreational user in order to obtain the accurate data necessary to make intelligent decisions. In return the recreational user will expect absolute authenticity in the application of the statistical information.²⁹

To have full public confidence the D.F.O. fishery statistics must be like Caesar's wife.³⁰

Consultative structures are discussed further in Chapter 13, and any new arrangements should be designed in the context of a general policy regarding consultative and advisory arrangements between the government and resource users.

Other issues The Commission has received comments on a variety of other sportfishing issues. The use of barbed and treble hooks has been controversial for some time; some suggest that they should be prohibited in order to reduce mortality of released, undersized fish, or to reduce the catch of sportfishermen, or to make sportfishing more "sporting." The argument about the mortality of undersized fish ("shakers") is obviously affected by rules regarding size restrictions, since the justification for prohibiting the more damaging hooks is undoubtedly stronger when size limits are applied. Regarding the second argument, given that the catch of sportsmen is regulated by means of bag limits and other controls, it is questionable whether these same objectives should be pursued by making it more difficult to catch fish. Regarding the third, any policy of ruling on what gear is "sporting" and what is not has been vigorously criticized. Such judgements are inevitably subjective, and have the effect of discriminating against the less expert fishermen who may nevertheless gain great satisfaction from catching fish.

Three other issues were raised repeatedly at the public hearings by spokesmen for sportfishing interests. One is the question of regulating commercial sportfishing. This is examined in the context of commercial fishing policy in Chapter 5. Another is the emphasis on sportfishing values in the Salmonid Enhancement Program, which is examined in Chapter 11. Lastly, the adequacy of enforcement is discussed briefly in Chapter 13.

FOOTNOTES

1. Roderick Haig-Brown, Bright Waters, Bright fish, Department of Supply and Services. Ottawa, 1980. p. 2.
2. Fernand J. Doucet and Peter H. Pearse, Fisheries Policy for the Pacific Coast: Issues and Advice. A report to the Minister of Fisheries. Vancouver, 1980.
3. W.D. Masse, "Questions and Answers on the New Sportfishing Regulations", Department of Fisheries and Oceans. Vancouver, 1981.
4. 1975 Survey of Sport Fishing in British Columbia Tidal Waters Summary of Results, Fisheries and Environment Canada, Fisheries and Marine Service. Ottawa, 1974. (Pre-publication release.)
5. British Columbia Sport Fishing Regulations Synopsis 1981/1982 for Non-Tidal Waters, Ministry of Environment, Fish and Wildlife Branch. Vancouver, 1981. p. 21.
6. P.F. Loftus and W.D. Masse, Impact of S.E.P. and S.E.P. Cost Recovery on British Columbia Sport Fisheries, Department of Fisheries and Oceans. Vancouver, 1979. Table 1:5, p.16.
7. British Columbia Sport Fishing Regulations.
8. Mary C. Harrison, Resident Boating in Georgia Strait, 1979 Update, Fisheries and Marine Service Manuscript Report #1538. Vancouver, 1979.
9. Mary C. Harrison, Resident Boating in Georgia Strait, 1979 Update, p. 6.
10. Exhibit #116, p.2.
11. William F. Sinclair, The British Columbia Sport Fishermen, Department of the Environment, Fisheries Service. Vancouver, 1972.
12. Sinclair, The British Columbia Sport Fishermen. This study estimates that in 1969, 44 percent of B.C. taxpayers had incomes of less than \$5,000, and 13 percent had more than \$10,000, while the corresponding figures for tidal sport fishermen were 7 percent and 33 percent. See also the income distribution of boat owners in Mary C. Harrison, Resident Boating in Georgia Strait, 1979 Update.
13. 1980 Survey of Sportfishing in Canada Preliminary Results, Department of Fisheries and Oceans. Released at the 1981 Sport Fishing Conference, July 1981, Calgary, Alberta.
14. Edwin, Reid and Associates, Employment and Income Directly Associated with Sport Fishing in B.C. Prepared for the Department of Fisheries and Oceans. Vancouver, 1981.
15. Exhibit #115, p. 2.
16. Salmon Sport Fishing Catch Statistics for British Columbia Tidal Waters, Ministry of the Environment, Department of Fisheries and Oceans. Vancouver, various years.
17. A.W. Argue, J. Coursley and G.D. Harris, Preliminary Revisions of Georgia Strait and Juan de Fuca Strait Tidal Salmon Sport Catch Statistics, 1972 to 1976, based on Georgia Strait Head Recovery Program Data. Ministry of Fisheries and the Environment, Fisheries Service, Pacific Region Technical Report PAC/T-77-16. Vancouver, 1977.
- Gerard J. Mos and Mary C. Harrison, Resident Boating in Georgia Strait. Ministry of the Environment, Fisheries Service, Pacific Region Technical Report PAC/T-74-5. Vancouver, 1974.
- Mary C. Harrison, Resident Boating in Georgia Strait, 1979 Update.
- 1975 Survey of Sport Fishing in British Columbia Tidal Waters Summary of Results.
- P.F. Loftus and W.D. Masse, Impact of S.E.P. and S.E.P. Cost Recovery on British Columbia Sport Fisheries.
- 1980 Survey of Sportfishing in Canada Preliminary Results.
- 1980 Tidal Sport Fishing Diary Program Results, Department of Fisheries and Oceans, Vancouver, 1981.
18. Recreational Fisheries, a background paper presented to the Commission by the Department of Fisheries and Oceans, August 1981.
19. A.W. Argue, J. Coursley and G.D. Harris, Preliminary Revision of Georgia Strait and Juan de Fuca Strait Tidal Salmon Sport Catch Statistics.
20. British Columbia Sport Fishing Regulations... For Non-Tidal Waters.
21. Loftus and Masse, Impact of S.E.P., p. 16.
22. Loftus and Masse, Impact of S.E.P., p. 41.
23. Implementation of a Sportfishing License and a Sport Registration Program in Canada's Pacific Tidal Waters, Department of Fisheries and Oceans, Submission to Treasury Board. January 10, 1981.
24. Exhibit #118, p.7.
25. Exhibit #115, p.11.
26. W.D. Masse and K. Peterson, Evaluation of Incremental Recreational Benefits from Salmonid Enhancement, Department of Fisheries and Oceans. Vancouver, 1979.
27. Exhibit #88, p. 8.
28. Exhibit #118, p.10.
29. Exhibit #118, p. 12.
30. Exhibit #115, p. 4.

Part Four

Conservation And Development

CHAPTER 10

Habitat Management

"The salmon are a test of a healthy environment, a lesson in environmental needs. Their abundant presence on the spawning beds is a lesson of hope, a reassurance that all is still well with water and land, a lesson of deep importance for the future of man."

RODERICK HAIG-BROWN¹

The discussion of fish resources in Chapter 2 dealt with the condition of the stocks. In a more fundamental sense, the resource base is the natural environment that supports fish. Unless the integrity and productivity of the aquatic habitat is protected, even the best of stock management will be to no avail. Whenever the environment that fish depend on for food or reproduction is damaged, the fish are threatened. Thus, the protection of aquatic habitat is considered by many to be the "first and foremost" problem of fisheries policy.² In short, if habitat goes so do the fish.

The habitat of many of our stocks has already been damaged. Growth of human population, continuing resource development and industrial expansion, new technology, and generally increasing demands on land and water have been taking their toll, and in the opinion of some observers, the habitat of some of our stocks is in a state of crisis.

The most valuable stocks on the Pacific coast are unusually sensitive to habitat disturbance because of their varied environmental requirements. The anadromous species, including the five species of salmon and steelhead and cutthroat trout, depend not only on the sea but also on inland waterways. In the fall or spring, mature adults migrate from the sea to lay their eggs in the gravel of freshwater lakes and streams. The eggs hatch, and the young migrate back to the sea, sometimes after a year or more in freshwater. After two to five years at sea, they return to their natal streams to spawn and die.

The dependence of these stocks on clean, undisturbed freshwater environments for critical stages of their life cycles is what makes them so vulnerable. Man's activities in watersheds, even hundreds of miles from the ocean, can upset the habitat and hence also the populations of fish.

On the Pacific coast of Canada this presents especially difficult problems of resource management. The mountain watersheds that support these valuable stocks also support

exceptionally valuable timber, and contain rich mineral deposits, hydroelectric opportunities, the best agricultural land, as well as the natural transportation corridors and urban development centres. Estuaries are frequently centres of population and commerce. As a result most resource development and industrial activity impinges on the habitat of fish.

All this leads to a conclusion that should be made clear at the outset of this chapter: environmental protection is more crucial on the Pacific coast than elsewhere. Standards of pollution control and regulation of waterflows that may be appropriate for Ontario or Saskatchewan may not be sufficient to protect the fisheries of the Pacific coast.

PRESSURES ON FISH HABITAT

Concern for the protection of fish habitat is widespread, and this was undoubtedly the issue in which there was broadest consensus among those who made presentations at my public hearings. Apprehensions about habitat deterioration and about our policies for controlling it are expressed not only by fishermen but also by many others who have a general concern for the natural environment and who often look to fish as a barometer of environmental integrity.

It is virtually impossible to quantify the impact on fish stocks of past damage to their habitat. In the first place, our historical statistics are inadequate. In the second place, damage from logging and other activities may not be permanent: streams have the power, over time, to flush and cleanse themselves from some kinds of damage. In the third place, the adverse impacts on stocks of overfishing and habitat damage are not always independent: one can aggravate the effect of the other. And finally, losses of habitat are often difficult to identify; they are frequently the result of a host of sub-lethal changes and individually minor pressures on the environment which, collectively, destroy its ability to support fish.

In particular watersheds or sites the major adverse effect on fish may be any one of a variety of sources of environmental damage. But in the Pacific region generally, the greatest potential threats to the habitats of salmon and related species are dams and diversions, forestry and mining.

Dams, Slides and Diversions

Obstructions in streams present the most direct barriers to mature fish on their spawning migrations and to young fish making their way to sea. Landslides, dams and diversions for hydroelectric and other purposes have taken a heavy toll on Pacific salmon and other anadromous stocks. Some of the most conspicuous and devastating effects have resulted from landslides into spawning rivers. Following the man-induced Hells Gate slide of 1912, the great Fraser River runs of sockeye salmon fell to about one-quarter of the number that had previously returned to the river. The slide was the principal cause, but dams built on the Adams and

Quesnel Rivers contributed to the destruction. Other stocks that depended on spawning beds above the slide, especially the large runs of pink salmon, were decimated also. Fishways built around the slide, beginning in 1945, and removal of the dams, have enabled these stocks to gradually recover, but they remain well below historic levels. The Babine slide of 1951 was removed and subsequently huge artificial spawning channels were built to enhance the Babine sock-eye runs. Other mitigating measures described in Chapter 11 have been taken elsewhere.

Dams were constructed early in this century in ignorance of or disregard for their effects on fish, with devastating results. The dam on the Adams River, built for logging purposes, and that on the Quesnel for placer mining have been mentioned. Other, more permanent dams were built on the Puntledge, Stave, Capilano, Bridge, Seton, Cheakamus, Jones, Kloiya, Nechako and Campbell Rivers, and on Great Central Lake. But some of the losses have been offset by artificial facilities, such as the Capilano and Puntledge hatcheries and the Seton spawning channels.

In the States of Washington and Oregon to the south, dams and diversions have been the major environmental insult to fish. In British Columbia, large hydroelectric dams and flood control works on major spawning rivers have been more vigorously opposed. And while the damage from this cause has been substantial—the dams on rivers such as the Puntledge have almost destroyed unique runs—hydroelectric dams have caused less permanent loss of fish on Canada's Pacific coast than have other causes of environmental damage. Yet, dams and diversions probably pose the greatest potential threat to natural salmon stocks. Whether technology will ever be developed to enable large runs of fish to pass over high dams, such as those that have been contemplated for the Fraser system, is questionable. Future losses will therefore hinge on political decisions about flood control and hydroelectric development.

Smaller scale diversions of water for irrigation and domestic and industrial water supplies have proven to be very damaging to fish in certain areas, especially in urban areas and in the agricultural regions of the lower Fraser Valley, on the east coast of Vancouver Island and in the dry ranching country of the interior. The heaviest demands for irrigation tend to be in the summer when flows are lowest and fish are rearing or migrating. Unless intakes are carefully screened, fish pass with the irrigation water into the fields.

Forestry

The canopy of forest that covers the watersheds of Western Canada protects the water systems that provide fish habitat. Removal of this cover inevitably disturbs the aquatic environment. The adverse impact of forest development and harvesting operations on fish habitat has received a great deal of attention in the public hearings. It is now widely agreed that logging and related activities have had a greater overall impact on salmon stocks than any other single source of habitat damage.

Logging in the early decades of this century was extremely destructive to anadromous fish. There were no controls to protect streams from road and railroad construction, log-jams and debris, log-driving, siltation, denudation of streambank vegetation and the many subtle effects of cutting, yarding and transporting timber. Massive loads of sediment left spawning gravel unproductive, and jammed logs and debris obstructed fish access to spawning and rearing waters.

The causes of some of these early losses, such as log driving and dams built for log transport, have since been eliminated. Many coastal streams have in large part recovered through years of flushing and forest regrowth. And there has undoubtedly been a great deal of improvement in forest management and operational planning, which has resulted in much less destructive logging and roadbuilding practices. But it is not possible to log the heavy timber on the mountainous west coast without causing some, at least temporary, disturbance to the aquatic environment, even with the best practices. The forest industry has expanded to a vast scale in British Columbia, clearcutting three to four thousand acres annually, and much of this logging has progressed beyond valley bottoms into the high elevations, steep slopes and unstable soils of the headwaters, posing new threats to stream stability. Moreover, there are recurrent examples of careless and unnecessarily destructive practices.

We now know a great deal about how the detrimental effects of forest operations on fish can be minimized. Logging operations can be dispersed to avoid removal of forest cover over entire watersheds all at once; unstable slopes can be avoided; streambank vegetation can be preserved and the streambeds left undisturbed; denuded areas can be quickly reforested; and logging and roadbuilding methods can be modified in a host of ways. But the successful application of these techniques requires a good deal of advance planning and information about the forest, soils, waterflows and fish. The present deficiencies in resource information, especially respecting fish, and in the regulatory provisions for integrating fish habitat requirements into forest development plans, are major obstacles to the protection of fish stocks.

Once timber is cut and removed from the coastal forest, most is transported by sea and stored in sensitive estuaries. This, too, can have serious impacts on the habitat of fish.

Estuary Development

Estuaries are among the most critical areas for fish. In the rich, shallow and slow-moving waters of estuaries, migrating salmon congregate before their final dash to their spawning grounds, and in the estuarine marshes the young fish pause to feed and make the transition from fresh to ocean water. The ecology of these areas is extremely complex and delicate, not only for migratory fish but for other species as well. Herring, smelt, sturgeon, shellfish and crabs are all dependent on the quality of the estuary and foreshore environments.

These estuaries are also the main centres of settlement, port and shipping facilities, industrial activities, dyking, filling, dredging, marinas and other developments. The concentration of human activity in these very areas is so highly critical for fish that much of the concern about fish habitat has focused on them.

The estuary of the Fraser River is the most crucial on the Pacific coast. It is unmatched in the size and diversity of fish stocks that depend on it. At the same time, more than half the population of British Columbia lives in the lower Fraser Valley, and it contains an even higher proportion of the industrial activity.

The problem of protecting the environment for fish in these circumstances is enormous. The administrative structure is itself extremely complicated; more than 60 federal, provincial and municipal agencies have responsibilities in regulating activities that affect the environment of the Fraser estuary. There are close to 200 permitted discharges into the estuary (below the Port Mann Bridge) and at least an equal number of storm-water outfalls. A recent official study of the estuary documented the trends in water quality since the 1960's, and found that a startling 80 percent of permitted discharges regularly exceeded the authorized limits of effluent quality or quantity.³ Most remarkable perhaps is that the water quality is still as high as it is, a result undoubtedly of the power of this great river to flush and cleanse itself. The two most worrisome problems are the long term effects of some of the toxic discharges, especially heavy metals and organic contaminants, that are accumulating in the estuary environment and about which very little is known, and the inexorable encroachment of development onto the wetland habitats crucial for fish.

Pollution

Freshwater and marine fish habitat can be destroyed not only by physically disturbing waterways but also by degrading water quality. Chemical pollution associated with pesticides, herbicides, acids, petroleum products, heavy metals, chemical spills and other waste products can all leave water toxic to fish.

Industrial wastes such as fibre from pulpmills, sawdust from sawmills and bark from forest operations sometimes coat spawning beds of rivers and streams. Silt from gravel operations, roadbuilding and other land operations plug the spaces in the spawning gravel so that eggs and fry cannot survive. Organic wastes, discharged in large quantities from sewage works, pulpmills, breweries, meat-packing plants and canneries, decompose and in the process rob the water of its oxygen, so that it is intolerable to fish. Waste heat added with effluents to water systems has biological effects that also reduce dissolved oxygen.

Some of the most toxic pollutants are discharged by mines and mine-milling operations. In British Columbia and the Yukon these industries have multiplied dramatically during the last two decades, and the scale of operations has grown as well. Consequently, mining has presented an

increasing threat to fish habitat. During the last few years, projects and proposals for mineral development have become the focus of controversy, mainly because of their uncertain potential effects on fish. The main concerns focus on the disposal of enormous quantities of tailings and the control of chemical effluents.

Urbanization

Ever-expanding urban and commercial development has destroyed or degraded much of the stream habitat in and around cities, particularly in the major centres of the lower mainland and southern Vancouver Island. Destruction of fish habitat in these areas takes place bit by bit, with culverting of creeks under roads and streets, dyking, streambed channeling, removal of streamside cover, installation of drain systems, and seepage of a host of toxic substances. Many streams that once supported salmon have simply disappeared in the wake of housing and industrial development, particularly in south Vancouver, Burnaby, New Westminster and Victoria. Others are seriously degraded; notable examples brought to the attention of this Commission include the Coquitlam River, Brunette River, and McNally Creek. Only recently have municipal authorities begun to think systematically about the preservation of natural streams within their boundaries.

Oil Spills

An environmental threat that has attracted worldwide concern during the last decade is that of oil spills, especially those that result from accidents involving large tankers and drilling rigs. The deficiencies of modern technology in coping with large spills and the damage they can do to sea life have been demonstrated time and again.

Some petroleum products are lethal to adult fish even at low concentrations,⁴ but by far the most acute effects are on fish in the egg and larval stages and on other marine organisms that they depend on for food. The impact is most severe in estuaries and inshore waters because of their importance as spawning, rearing and feeding areas for fish.

Probably the most vulnerable of the major commercial species along the coast of British Columbia is herring. This species spawns on algae and other intertidal vegetation or on rocks when no vegetation is available. After they hatch the larvae drift with the currents near the surface. Oil drifting inshore can kill both eggs and larvae. Shrimps, prawns, crabs and a variety of shellfish and bottom fish are similarly susceptible in their larval stages. Some of these do not now support significant fisheries but are abundant and important in the food chains of commercial species. Even some of the more resistant species would be weakened or tainted by oil and thereby rendered unusable.

Even more damaging to bottom fish are chemical dispersants, emulsifiers and sinking agents used to clean up oil spills, which are sometimes toxic in themselves. But even when they are not, sinking hydrocarbons can poison fish either directly or through the food chain.

We are fortunate that few major oil spills have occurred off the coast of British Columbia and, on the whole, permanent damage to fish from this source has not been great. But expanding domestic and U.S. tanker traffic, oil port developments, and especially the possibility of oil drilling activity, pose increasing hazards to fish against which available technology offers only limited protection.

Other Impacts

The threats to fish habitat mentioned above are only some of the most conspicuous; others include road, railroad, pipeline and transmission line construction, and water quality degradation from sometimes unidentifiable sources. Important also are natural variations in the environment. Fishermen as well as biologists know that unpredictable shifts in ocean currents can profoundly alter the migration patterns of stocks; droughts and low streamflows during the summer can affect rearing fish and leave spawning grounds inaccessible; extreme cold, or heavy rains (such as occurred last fall), can devastate eggs overwintering in stream gravel, and so on. The impact of such events is usually most serious when the stocks are already weakened by other damage to their habitat or, especially, by overfishing. The environment that supports our Pacific fisheries is being assaulted from many directions, and to protect it so that our fish resources can be maintained as everyone wants, we will need a strong and comprehensive habitat management policy.

Experts generally agree that, of the various sources of habitat degradation, those that pose the most serious threat are dams and diversions, forest operations, mining activities and foreshore development. Preventing all losses in the future, even if substantial additional funds were provided to meet new challenges, might be impossible, but much can be done to mitigate damage and to offset it. The policies needed to prevent further declines in stocks relate not only to habitat protection but also to stock management and enhancement. None of these is likely to be adequate in itself; rather all three must be integrated into a resource management program.

PROBLEMS AND POSSIBILITIES

Jurisdictional Issues

A fundamental problem for habitat protection is the division of responsibilities between the federal Parliament and provincial legislatures. The constitution does not deal directly with environmental matters. Instead, the federal Parliament, with overall jurisdiction for "sea coast and inland fisheries," has general responsibility for management and conservation of the stocks, while the provinces, with jurisdiction over freshwater and land-based resources, such as forests and minerals, control most of the activities that affect fish habitat. By a long-standing agreement with the federal government, the Provincial government has assumed responsibility for managing shellfish, freshwater sportfishing and freshwater fish, including the anadromous trout. Responsibility for regulating the use of marine plants is less clear. Although the Federal Fisheries Act clearly deals with

the licensing of marine plants, the Province has jurisdiction over the foreshore. Moreover, the Province is deeply and increasingly involved in regulating fish processing and pollution controls, and in research and resource inventories, enhancement and so on. The problem is further complicated by division of responsibilities for environmental matters among several Departments or Ministries at both levels of government.

With overlapping constitutional responsibilities for regulating fish habitat and activities that affect it, effective habitat protection calls for liaison and cooperation between the federal and provincial governments. At the technical and administrative levels, and in the field, a great deal of informal cooperation has evolved between the agencies of the two governments. But these working arrangements are not supported by formal agreements and they sometimes break down, leading to recurrent confrontations over such developments as the pulpmill at Kamloops, log-driving on the Stellako river, dams on the Fraser River, estuary projects, and logging programs like the one at Riley Creek. This friction is frustrating for the public officials involved and does not offer much assurance for systematic protection of fish habitat. What is lacking (with the notable exception of the joint Salmonid Enhancement Agreement) is any formal agreement or understanding between the two governments about their respective roles and responsibilities and their arrangements for cooperation.

Reconciling the often conflicting interests and responsibilities of the two governments is a formidable political and administrative problem. But as long as the constitutional division of authority remains as it now is, the general direction of needed reform is clear: arrangements must be made to improve intergovernmental coordination. Both governments have a common objective in protecting fish habitat, as repeatedly indicated in public statements. This common purpose is formally declared in their joint Salmonid Enhancement Agreement which has as a main objective "... to preserve, rehabilitate and enhance..." natural stocks.⁵ Both have established laws, regulations and administrative arrangements specifically designed to protect fish habitat. The problem is to bring these efforts together in a coordinated and efficient way, to establish a clear policy framework with acceptable standards and orderly procedures, and to eliminate duplication of effort and sources of friction.

Both governments appear to recognize the need to harmonize their approaches to environmental protection, and to reduce duplication, confusion and conflict. The following are the main alternatives that have been suggested:

1. Re-allocate constitutional responsibilities to eliminate jurisdictional overlap. This proposal implies transferring all fish habitat-related responsibilities to one government. I do not consider it appropriate for this Commission to enter into the debate over the constitution, apart from identifying problems that it can give rise to. However, it should be noted that allocation of the federal

responsibilities for habitat protection to the Province would be considerably more practicable; the reverse would imply transferring the whole array of resource related responsibilities of the Province, which are its main instruments for shaping economic and social development.

2. Delegate to the Province the responsibility for administering the relevant federal legislation. This technique has been used in assigning to British Columbia the responsibility for freshwater fisheries, and Ontario and Quebec have formally been delegated responsibility for administering the federal Fisheries Act in those provinces.
3. Establish an accord between the governments of Canada and British Columbia to coordinate their activities in environmental protection. Such accords have now been entered into by the federal government with all provinces except Newfoundland, Quebec and British Columbia. Through these accords, the province agrees to enforce environmental requirements (such as pollution standards) at least as stringent as those required under federal regulations. Procedural arrangements are designed to avoid duplication, to enable provincial authorities to be the main channel of communication with the private sector, and to undertake joint programs of research and development.
4. Encourage further informal cooperative arrangements between the two governments through explicit political statements of support.

Delegation of authority to the Province to administer federal legislation by contract or an accord offers obvious advantages in rationalizing the two governments' administrative and procedural arrangements for dealing with environmental problems. There appear to be at least three apprehensions about any such solution, however. First, there is concern that the Province, with its greater interest in other, conflicting, resource industries such as forestry and mining, might be inclined too often to compromise the protection of fish habitat. Second, for reasons explained below, the present federal and provincial statutes (especially the federal Fisheries Act and the provincial forest legislation) take such divergent approaches to resource management that they are likely to be difficult to administer jointly by the same agency. Third, by administering its policies "through" the Province, the federal government may lose flexibility in implementing legislation.

Legislation

Since Confederation, the main instrument of the federal government in protecting fish habitat has been the Fisheries Act,⁶ but other federal statutes have important functions as well. The Environmental Contaminants Act,⁷ administered by the Department of the Environment, is aimed mainly at assessing the dangers of contaminants and regulating their use from manufacture through to disposal, including the insidious chemicals such as PCB's and chloroflourocarbons that enter the environment from a variety of industrial and

other sources. It is not aimed specifically at fisheries problems, but it does provide protection against persistent and toxic chemicals that can poison fish habitat.

The Ocean Dumping Control Act,⁸ administered by the Environmental Protection Service, enables the Minister of the Environment to control dumping into the sea of certain substances harmful to fish or human health. Permits are required to authorize dumping by Canadian ships anywhere in the world and any ships in Canadian waters, and before approval all permits are referred to the Regional Ocean Dumping Advisory Committee, which includes representatives from the Department of Fisheries and Oceans and the Province of British Columbia. Most applications relate to dredging.

The Canada Water Act,⁹ passed in 1970, enables the federal government to enter into agreements with provinces to plan and manage water resources. Under this Act, funds have been provided for studies of the Fraser River Estuary, the Okanagan Basin and the Thompson River Basin.

The main provincial statute for pollution control is British Columbia's Pollution Control Act,¹⁰ administered by the Waste Management Branch of the Ministry of Environment. This Act created the Pollution Control Board and the Office of the Director of Pollution Control. With a few specific exceptions, any person or company that discharges wastes or contaminants is required to hold a permit issued by the Director. Objectives are specified with respect to the abatement standards required by various industries, and permits are usually based on these objectives. However, the Director has wide discretion and, subject to an appeal process, is not bound by the objectives in issuing permits. Permits sometimes incorporate requirements recommended by federal authorities.

The British Columbia Water Act¹¹ asserts ownership by the provincial Crown of virtually all fresh water, and requires users to acquire licenses from the Comptroller of Water Rights to divert, store or withdraw water. The Act lists the beneficial uses and users of water, but conspicuously, no mention is made of fish.

Another important provincial statute is the Environment and Land Use Act,¹² which provides for a Cabinet Committee to review proposed industrial and other developments and to reserve sensitive areas.

The Environment Management Act,¹³ is the latest legislation available to the Province for habitat protection. It gives the Minister of the Environment emergency powers as well as authority to require mitigation and abatement of adverse environmental impacts.

These are only the most important legislative instruments for protecting fish and aquatic habitats; there are many other acts and regulatory bodies that relate to these matters. All of these statutes are amplified by regulations, which are often as influential in effecting the purpose of the legislation as the acts themselves. Moreover, the administering agencies

have a wide range of policies and practices for applying the laws and regulations which further determine their effectiveness in environmental control.¹⁴

In the public hearings, most criticism centred on the federal Fisheries Act and especially the recent amendments to it. Until 1970, the Act focused almost entirely on penalties for depositing material into waterways, under the well-known provision of section 33(2) that "...no person shall deposit... a deleterious substance of any type in water frequented by fish or in any place under any conditions where such deleterious substance... may enter any such water."¹⁵ This remains the core of the pollution control provisions of the Act.

In 1970 and 1977, controversial new amendments were made. They broadened the scope of "fish" to be protected and of "deleterious substances" prohibited; included new controls on physical disruption of foreshore areas and other habitat; shifted the burden of proof of whether waters are "frequented by fish" from the Crown to the defendant; and strengthened other provisions. Section 31 was repealed and a new section substituted which states that "No person shall carry on any work or undertaking that results in the harmful alteration, disruption or destruction of fish habitat."

These last amendments, particularly, were opposed by provincial governments. The Premier of British Columbia summarized his criticisms as follows:

The mutual objective of avoiding duplication of government regulations, particularly in relation to resource-based industries, will not be furthered by the proposed legislation. The close co-operation we have enjoyed in the environmental field may be jeopardized. The proposed legislation is oriented to a single resource—albeit of considerable importance to this Province—but is out-of-step with the multiple resource use essential to the development of a healthy economy in British Columbia.¹⁶

Although opposition was expressed as well by the forest and other industries, the legislation was passed by Parliament in 1977.

Enforcement and enforceability The general prohibition against "... deposit of a deleterious substance of any type..." appears to provide thoroughgoing power to protect fish habitat. The strength of the legislation has been applauded by some commentators, who often suggest that habitat protection is nevertheless inadequate because the Department is too lax in enforcing the law.

However, other participants in the public hearings have pointed out that the law is so unqualified that it leaves virtually any industrial activity that discharges waste continuously liable to prosecution.

This is because most substances are injurious to fish under certain circumstances... even a saturated solution of common salt will be a deleteri-

ous substance although it is a major constituent of seawater.¹⁷

As long as the legislation fails to specify the concentration of a substance that is to be prohibited, it cannot be strictly enforced without shutting down much industrial activity, whether it is damaging to fish or not. Moreover, some activities are prohibited by the Fisheries Act even though their effect on fish habitat might be negligible in relation to other values.

These criticisms seem justified and, perhaps paradoxically, the uncompromising power of the Act may help explain the widespread complaint that these strong habitat protection provisions are not rigorously enforced. If, as a practical matter, they cannot be usually and consistently applied, their breach becomes normal, and they become something of a paper tiger. Yet, they leave anyone who operates in a watershed or discharges waste, even one who complies with plans approved by the Department or who meets official standards for pollution control, potentially liable to a charge at the discretion of a public official. Interpretation of the Act thus becomes subjective and enforcement inconsistent. In any event, the deficiency of the legislation is not that it is too weak, but rather that it does not lend itself to consistent enforcement.

Several participants suggested that the Act should be amended to define what is to be considered deleterious in a more realistic and enforceable way. An alternative suggestion is that supplementary regulations (which are provided for in the Act) be adopted to specify permissible concentrations in the effluent or in receiving waters, and to clarify activities that involve a "harmful alteration or disruption of fish habitat." These, if appropriately specified, would ensure that habitats were properly protected.

However, Fisheries biologists advise that tests of the survival of fish (bio-assay tests) are the only reliable means of establishing toxicity from a fisheries standpoint. They contend that it is extremely difficult to express safe concentrations either for the effluent or receiving waters because of inadequate knowledge about fish tolerance, about the cumulative or synergistic effects of combinations of individual pollutants, about the processes of the natural environment and about the sub-lethal effects of pollutants.

The enforcement of the habitat protection provisions of the Fisheries Act was frequently criticized by participants at the public hearings as being inadequate. They usually argued that offenders were often not prosecuted and when they were, the penalties were inadequate to provide a meaningful deterrent. Others argued that the penal approach to pollution control was misconceived, and that emphasis should be shifted to preventive planning.

Out of more than 3400 charges laid during the past three years for fisheries offenses, only 129 have been laid under the habitat protection sections of the Fisheries Act. Of these, more than 80 percent led to convictions. Such a high level of prosecutions may indicate that suits are launched only when the prospects of success are extremely high.

Criticism is aimed also at the failure to enforce conditions of provincial pollution control permits. Analyses of the degree of compliance with these permits indicate that dischargers frequently exceed their permitted discharges and that many offenders are not prosecuted.¹⁸

Procedures for approval of industrial projects When a new industrial development project will involve releasing effluents into water courses, the developers must obtain a discharge permit issued by the Director of the Provincial Waste Management Branch. The standards of pollution abatement required under these permits is influenced by the objectives for each industrial sector (mentioned earlier), and often as well by recommendations from the Department of Fisheries and Oceans and the Environmental Protection Service. Separate permits are not issued under the Fisheries Act. In practice the two federal agencies develop habitat protection requirements according to the circumstances in each case and typically in consultations with the provincial authorities and the project's proponents.

Once industrial development projects are in place, their effluents are monitored by the provincial and federal authorities. To determine whether a discharge is deleterious to fish, a bio-assay test is generally carried out on a regular or *ad hoc* basis. In these tests, fish are subjected to the effluent at specified concentrations for 96 hours, and if half or more of the fish survive, the effluent passes the test. If the operation fails the test, the authorities negotiate with the company to improve abatement, and if it continues to fail to meet the standard then charges are considered.

Under authority of the Fisheries Act, Environment Canada has issued national effluent regulations for each of six industries, the four major ones being pulp and paper, metal mining, chlor-alkali plants and petroleum refineries. These regulations apply to all of Canada, including those provinces that have assumed responsibility for fisheries management.

In designing future regulations for water pollution control, the emphasis will apparently be on toxic chemicals that have long-term effects on the environment and threaten human health. Fish habitat protection, where the federal government takes direct responsibility, will be based on site-specific regulations under the Fisheries Act.

The administration of standard effluent regulations has recently been controversial, as in the case of Amax Mines operating in Alice Arm. The Mining Effluent Regulations prohibit unconfined disposal of tailings and stipulate that a special exemption must be obtained where the Minister considers it appropriate. Under this provision the Alice Arm Tailings Deposit Regulations were passed by Order-in-Council which permitted Amax Mines to discharge tailings into the sea under prescribed conditions. Local Indians and others concerned with the protection of fish habitat were alarmed by this action, and the federal government was criticized, not only for issuing special regulations for a project that might endanger fish habitat, but also for the manner in

which they were issued. Critics have argued at the public hearings that the federal Cabinet tampered with national standards, and did so without effective notice.

There was no offering of public input, no opportunity for public input by the Nishgas, either on the federal process leading to the special regulations, or in the provincial process, leading to the permit being issued by the Pollution Control Branch.¹⁹

Strong arguments have been made for effective notice, especially to those most directly affected, before exemptions from standard effluent control requirements are considered. Many participants have also suggested that proposals for such industrial developments should be based on thorough environmental impact assessments and public hearings.

Resource integration Another frequent criticism of the Fisheries Act is that it fails to recognize other resource users or to provide for integrated resource planning and development. Several participants have contrasted the single-mindedness of this legislation with British Columbia's Ministry of Forests Act, which charges that ministry to plan the use of resources so that

the production of timber and forage . . . the realization of fisheries, wildlife, water, outdoor recreation and other natural resource values are coordinated and integrated, in consultation and cooperation with other ministries and agencies of the Crown and with the private sector.²⁰

Forest harvesting and development plans are routinely referred for comment, criticism and suggestions to other governmental agencies, including the federal Department of Fisheries and Oceans, but as spokesmen for the forest industry have pointed out:

The Fisheries Act remains silent on the existence of other resource uses or users, and this places the (Fisheries) Officers, in our opinion, in a very difficult position. The current referral process is working in spite of, not because of, the tunnel-visioned Fisheries Act. These Officers do a very commendable job, considering their legislated terms of reference.²¹

Significantly, the Department acknowledged this problem in a submission to the Royal Commission on Forest Resources of British Columbia a few years ago:

. . . this [Fisheries] Service welcomes the opportunity to maintain a direct liaison and active participation in this system of integrated resource management . . . However, critical liaison procedures are not consistently established or well-defined.²²

This deficiency persists today.

In the circumstances of British Columbia, the lack of legal authority for fisheries officials to engage formally in integrated resource development planning is regarded as particularly serious. Accordingly, some have proposed legislative amendments to encourage the Department to participate fully with other governmental agencies and the private sector to ensure that the needs of fish are adequately recognized in resource development plans.

Other criticisms Another frequent criticism of the environmental protection system is the current duplication of controls by the federal and provincial authorities. Most industries that discharge wastes must meet both federal and provincial requirements. For example, the pulp and paper industry is subject to the effluent regulations of the provincial Pollution Control Act as well as the strictures of the federal Fisheries Act. Where the regulations differ, mills must comply with whichever is the most stringent. This kind of duplication of regulations is a continuing irritant to the affected industries. To alleviate the problem, some have suggested a single set of controls specified by one government, or at least a single governmental agency responsible for enforcing all regulations by means of arrangements described earlier in this chapter.

Other criticisms of the Fisheries Act include its failure to require proof that the deposit of a deleterious substance has actually been harmful to fish, the lack of any provisions for appeal, its broad scope, which extends beyond protection of fish, its improper dependence on criminal rather than civil proceedings, and generally its penal approach to regulation.

Division of Federal Responsibilities

Responsibilities for protecting the environment and fish habitat are dispersed among Departments of the federal government, and some of the more important controls lie beyond the authority of the Department of Fisheries and Oceans. This is mainly the result of a series of governmental reorganizations. In 1971 the government created the Department of the Environment which brought together a conglomerate of services relating to fisheries, forestry, wildlife, inland and marine waters, and meteorology. At the same time it created a new organization, the Environmental Protection Service, to coordinate pollution control and environmental protection. This new Service was to become the single point of contact for the public, industry and governments for dealing with environmental problems, and it was given responsibility for administering all federal legislation relating to pollution control, including Section 33 of the Fisheries Act (the "deleterious substance" section).

In 1975 fisheries was accorded greater recognition through appointment of a Minister of State for Fisheries under the Minister of the Environment. This Minister had responsibility for most fisheries legislation with the notable

exception of Section 33 of the Fisheries Act, which remained with the Environmental Protection Service of the Department of the Environment. Until 1978 the Department of Environment had one Deputy Minister and two Senior Assistant Deputy Ministers, one for fisheries and one for environment.

A separate Department of Fisheries and Oceans was created in 1978. The new Minister of Fisheries and Oceans was assigned responsibility for the Fisheries Act, including Section 33, but the Environmental Protection Service continued to administer Section 33 pending further studies. The transfer has still not been made.

This division of responsibilities may impede effective habitat protection. It divides access to information needed to direct activities, it dilutes the power of the Department of Fisheries and Oceans to pursue its resource management functions, and it raises the possibility of conflict between the Department and the Environmental Protection Service, all of which are obstacles to efficient habitat protection.

Also awkwardly divided are responsibilities for environmental emergencies resulting from marine accidents. Emergencies associated with spills of oil or toxic chemicals from shore-based facilities are dealt with under the Fisheries Act and fall under the authority of the Department of Fisheries and Oceans; but the Environmental Protection Service continues to deal with spills through its Environmental Emergency Branch. Responsibility for dealing with spills from ships falls to the Department of Transport under the Canada Shipping Act, although responsibility for protecting the environment when such spills occur rests with the Departments of Fisheries and Oceans and Environment. In addition, the Province of British Columbia is assuming a more active role in oil spill control, bringing the number of major agencies concerned with such accidents to four.

This pattern of allocation of environmental responsibilities needs to be re-examined. In particular, a strong case can be made for allocating to the Department of Fisheries and Oceans the authority for implementing the main legislation intended to protect the marine environment and fish habitat. In addition to providing a more orderly structure of responsibilities, this might also lead to savings in personnel and costs by eliminating some of the present duplication of effort.

Regional Organization and Resources

Many participants in the Commission's hearings have maintained that the staffing and administrative provisions for habitat protection on the Pacific coast are inadequate. Habitat work in this Region is done by three separate Branches within the Department of Fisheries and Oceans and, as already noted, by other Departments as well. The main agencies involved and the resources devoted to fish habitat protection are summarized in Table 10-1.

Table 10-1 Estimated resources devoted to fish habitat protection in the Pacific Region.

<u>agency</u>	<u>manpower</u> (person-years)	<u>budget</u> (millions of dollars)
Department of Fisheries and Oceans		
Field Services Branch		
Habitat Division	42	1.8
Fisheries Officers	42	1.4
Resource Services Branch (Research)	21	0.9
Salmonid Enhancement Program	30	3.7
	135	7.8
Department of the Environment		
Environmental Protection Service	50	2.0
International Pacific Salmon Fisheries Commission	10	0.3
TOTAL	195	10.1 (approx)

Source: Data supplied by the respective agencies.

The Habitat Division of the Field Services Branch of the Department of Fisheries and Oceans has the main responsibility for dealing with habitat problems, though district Fisheries Officers also devote a significant portion of their time to enforcing legislation in the field. The Resource Services Branch conducts habitat-related research in Nanaimo and West Vancouver. The Salmonid Enhancement Program, based in Vancouver, is directly involved in habitat improvement projects. The Environmental Protection Service of the Department of the Environment, as already explained, deals with pollution control and environmental emergencies, and the International Pacific Salmon Fisheries Commission conducts research and habitat-improvement work on the Fraser River System. Altogether, about 195 person years and 10.1 million dollars are currently being directed to habitat protection, management and improvement.

A number of specific suggestions were made in submissions to this Commission that deserve consideration as means for improving the effectiveness of habitat protection efforts; these are summarized briefly here:

1. Fisheries Officers are stretched too thinly to adequately inspect sites and provide consultations. It has therefore been suggested by those who consider the protection of fish habitat to be inadequate and by spokesmen for the forest and other industries that the Fisheries Officer staff should be strengthened. Moreover, inspections could be facilitated through better use of aircraft, particularly helicopters.
2. Field offices of the Department need more support from biologists who have local knowledge to assist with planning and referrals relating to forestry and other resource developments in watersheds. Decentralization of biological staff has been suggested as a means of alleviating this

problem and improving communication with senior management.

3. Several participants cited examples where local Fisheries Officers were frustrated in attempts to prosecute offenders by insufficient support from legal and other staff of the Department. Improvements in legislation, approval and appeal procedures, operational guidelines, and regional staffing, as well as stronger determination to enforce the regulations, have all been proposed as means of overcoming this weakness.
4. There is insufficient coordination between the Habitat Protection Branch and the Salmonid Enhancement Program. It has been suggested that the efforts of these two groups would be more effective if they developed a closer working relationship or perhaps were integrated into one group.
5. Similarly, the separation, made a few years ago, of habitat research to the Resources Services Branch from the Habitat Division might be reconsidered.
6. Fisheries resource inventories are seriously deficient, which is a major impediment to effective participation by the Department in integrated resource development planning. Many participants have emphasized the urgent need for inventories of streams and fish habitat as essential information to improve ecological knowledge, to evaluate opportunities for enhancement and to enable informed assessment of other resource development plans.
7. Research into the impact of forestry and other activities on fish habitat, and into various ways of mitigating adverse effects, is deficient. More long-term ecological studies such as the Carnation Creek project were frequently recommended.
8. Fisheries personnel are handicapped by the lack of any systematic method of ascribing values to fish habitat and, hence, also in prescribing defensible mitigation requirements. Accordingly, it is suggested that resource information be improved and suitable guidelines for assessing values established.

Approaches to Habitat Management

Hitherto, the stance taken by the Department with respect to its responsibilities for fish habitat has been mainly defensive. The policy appears to have been to minimize habitat damage from competing interests by reacting to proposals referred to the Department by industry and by provincial and federal agencies, by imposing constraints and modifications to these plans, and by policing performance. These activities are undoubtedly necessary, but many now question whether they are sufficient, pointing to the gradual erosion of fish habitat and the high public and private costs in attempting to protect all fish in all circumstances.

As one participant put it:

There will be occasions when fish must give way to the thrust of new development and on these

occasions it would be reasonable to extract compensation. This is made difficult by evaluation problems, defining who has been damaged and other matters relating to common property. At times it may be appropriate to provide for fish enhancement in lieu of compensation for losses. In any event, it is better to come away with something, rather than nothing other than "so sorry."²³

This suggestion implies that in the long run the interests of fisheries may be advanced more effectively if the Department, instead of simply reacting defensively to incursions on fish habitat, adopted a more positive, aggressive and flexible approach to habitat management. In view of the wide opportunities for habitat rehabilitation and stock enhancement, the decline in production through habitat loss might be reversible by requiring those who cause damage to improve or develop habitat elsewhere in compensation or to contribute to a fund for that purpose. Officials of the Department have labelled this a "no net loss" approach.

Others have vigorously opposed this view on grounds that it invites compromises on habitat protection by facilitating developments that will be damaging to fish, and that the relevant fisheries values are impossible to estimate accurately. Moreover, it may tempt other industries and the Department to accept compensatory measures routinely as a substitute for protecting the natural environment. It is argued that the objective of preventing any erosion of fish habitat should be maintained, and opportunities for enhancement pursued in addition, which implies something more than "no net loss."

The question of how the Department should approach its responsibilities in habitat protection obviously relates to its mandate under the Fisheries Act and to its planning and approval policies referred to earlier. These issues are fundamentally important in the development of habitat policy, and must be studied carefully and objectively.

Several commentators at the public hearings have argued that, regardless of the approach taken toward mitigating or compensating for damage, the Department's policy should be broadened from its traditional preoccupation with habitat protection to include habitat management. Renaming and upgrading the Habitat Protection Division to the Habitat Management Branch would signal this shift in emphasis, and I understand this is already being considered.

Consultative Arrangements

Integrated resource planning and management implies some mechanism for bringing together and coordinating resource uses and development activities, and so raises the question of appropriate consultative arrangements. Some experience now exists on several alternative techniques. The planning referral process, notably that associated with forest development plans, has already been explained. The major limitation of this approach is that from the viewpoint of fisheries management it is essentially only responsive to

other resource demands and hence serves to minimize habitat damage at best.

A broader, more balanced approach is exemplified by the Coordinated Resource Management Plans developed and executed by inter-agency planning committees concerned with rural resource development, and funded under the Agricultural Rural Development Subsidiary Agreement. These plans, designed to resolve conflicts and to enhance resource productivity have shown very promising results, for example, in developing Crown range lands for grazing.

A somewhat similar approach was initiated last year on the Salmon River in a small project in which fisheries management is the primary component. This project, sponsored by the Salmonid Enhancement Program, involved detailed assessments of the fish stocks and habitat improvement opportunities in the watershed.²⁴ The results were integrated with information about other resource uses and users within a practical and economically feasible framework. This project has already demonstrated the benefits to be gained from coordinated planning of this kind.

The 1970 Canada Water Act offers a more formal mechanism for planning watershed development. The Act is intended

... to provide for the management of the water resources of Canada including research and the planning and implementation of programs relating to the conservation, development and utilization of water resources.

The Act generally stresses joint federal-provincial approaches to water resource management, and has already provided the framework for the Fraser River Estuary Study and the Thompson River Study mentioned earlier.

Finally, a number of suggestions have been made to the Commission for structures that would enable broader public participation in planning the development of river systems. During the last few years, a number of organizations have been formed with specific interests in particular rivers—the Nechako, Bulkley, Cowichan, Nanaimo and lower Fraser, to name a few. Other native Indian and environmental organizations also have interests in particular watersheds or areas. Several groups have suggested that it would be advantageous to establish formal advisory or regulatory boards that would oversee particular river systems, consider proposals and plan developments on them. Analogies are made with the River Authorities in Britain and the Conservation Authorities of Ontario.²⁵ This kind of structure has implications well beyond fisheries policy, of course, but may afford some of the same advantages as coordinated planning procedures.

Whatever the consultative arrangements adopted, successful coordination and integration of fisheries management with other resource demands will require substantial improvements in information relating to fish habitat. Fish production potential of watersheds and management areas

will have to be assessed; objectives consistent with the targets for other resources will have to be specified; and maintenance and development provisions for the habitat will have to be made to meet these objectives. The process involves joint planning to resolve problems and to take advantage of opportunities for complementary activities. The Government of British Columbia is currently preparing legislation to develop new coordinated planning procedures for resources under the jurisdiction of the Province. If the

Department of Fisheries and Oceans is to participate in this process, it will need to develop a corresponding capability.

All the possibilities for improving fish habitat management discussed in this chapter will be studied further before I formulate recommendations in my final report. In the meantime, I hope to receive additional commentary and suggestions on this fundamental aspect of fisheries policy.

FOOTNOTES

1. Roderick Haig-Brown, cited in The Implementation of a Cooperative Watershed Planning and Management Program for the Salmon River Watershed — Langley, B.C. A report prepared for the Salmonid Enhancement Program. Vancouver, 1981.
2. Exhibit # 138, Conclusion p.1.
3. Fraser River Estuary Study Steering Committee, Fraser River Estuary Study Summary, Queen's Printer. Victoria, 1978.
4. Potential Pacific Coast Oil Ports: A Comparative Environmental Risk Analysis, Department of Fisheries and Environment. Vancouver, 1978.
5. "Federal-Provincial Agreement; Salmonid Enhancement Program," Memorandum of Agreement signed by the Minister of Fisheries and Environment for Canada and the Minister of Environment for British Columbia. March 1, 1979.
6. Revised Statutes of Canada 1970, chapter f-14 and amendments thereto.
7. Statutes of Canada 1975, c. 72.
8. Statutes of Canada 1975, c. 55.
9. Revised Statutes of Canada 1970, c. 5.
10. Revised Statutes of British Columbia 1979, c. 349.
11. Revised Statutes of British Columbia 1979, c. 429.
12. Revised Statutes of British Columbia 1979, c. 110.
13. Environment Management Act, 1980-81 Session Bill 22, proclaimed July 1981.
14. L. John Alexander, Legal Provisions for Linked Management Systems. A report submitted to the Management Systems Sub-Committee of the Fraser River Estuary Study, Vancouver, 1981.
15. R.S.C. 1970, c. f-14, Section 33(2).
16. Letter from the Premier of the Province of British Columbia to the Prime Minister of Canada, April 27, 1977.
17. Exhibit # 135, p. 5.
18. Fraser Estuary Study Steering Committee, Report on Industrial Effluents, Queens Printer. Victoria, 1980.
19. Nishga Tribal Council, in testimony before the Commission, June 24, 1981. Proceedings, p. 7994.
20. R.S.B.C. 1979, c. 212.
21. Exhibit # 135, p. 8.
22. The Implication of Forest Tenure on Fishery Resource Protection in British Columbia, Brief to the Royal Commission on Forest Resources. Department of the Environment, Fisheries and Marine Service. Vancouver, 1975.
23. Exhibit #98, p. 12.
24. Howard Paish and Associates, The Implementation of a Cooperative Watershed Planning and Management Program for the Salmon River Watershed — Langley B.C.
25. R.S. Campbell, P.H. Pearse, A.D. Scott and M. Uzelac, Water management in Ontario: An economic evaluation of public policy, Osgoode Hall Law Journal, 12(3). Toronto, 1974. p.475-526.

CHAPTER 11

Resource Enhancement and Aquaculture

"It is part of the mystique of the Pacific that salmon come home to spawn, and it is a part of every child's education to join in the aboriginal traditions of reverence for salmon. For cultural reasons alone, salmon enhancement is much to be desired."

PETER LARKIN¹

In the introductory chapter to this report I noted that the dependence of our predominant fish resource, salmon, on rivers and streams at the beginning and end of their life cycles, gives rise to both problems and opportunities. The major problem is that the stocks are vulnerable to disturbance of their spawning habitat through industrial activity on the adjacent lands, pollution, diversions and obstructions of waterflows, and other environmental damage described in the preceding chapter. The major opportunities are two-fold: first, the reliable return of anadromous fish to their natal streams toward the end of their life makes them potentially easy to harvest and manage. Second, it leaves the stocks highly amenable to enhancement, through improving spawning beds and artificially increasing the productivity of spawning fish. This chapter deals with enhancement policy, its problems and its prospects.

Nowadays, enhancement is associated with the major Salmonid Enhancement Program that began in 1977. But the history of efforts to build up the stocks of salmon on the Pacific coast began a century ago.² According to the annual reports of the Department of Marine and Fisheries (as the federal department was then called), a request from Ottawa in 1882 led to construction of the first hatchery in British Columbia on Bon Accord Creek at Port Mann on the lower Fraser River. This hatchery produced sockeye and chinook salmon. In the decades that followed, many experimental projects were undertaken with various types of hatcheries and fishways. Unfortunately, most of these projects, especially hatcheries, were unsuccessful and shortlived; in fact, all salmon hatcheries were closed in 1937. Only after World War II was a concerted federal effort made to rehabilitate and enhance the fisheries.

In the two decades following the war, major fishways to facilitate the passage of salmon upstream were constructed on the Fraser, Bulkley, Nass, Cowichan, Somass, Sproat,

Indian and Naden Rivers. The most ambitious and probably the most successful project, was the fishways built at Hells Gate which began operation in 1945. It was jointly financed by Canada and the United States under the auspices of the International Pacific Salmon Fisheries Commission, which was established to manage and rehabilitate Fraser River stocks after they had been devastated by a slide caused by railroad construction through the canyon decades earlier. The first spawning channel was built at Jones Creek in 1953, and during the next two decades additional projects of this kind were constructed at Robertson Creek, Big Qualicum River, Weaver Creek, Seton Creek and the Babine River system. Some of these were very costly. The Babine Lake Development Project, involving flow control and spawning channels on the Fulton River and Pinkut Creek during the late 1960's, cost roughly \$10 million and is the largest spawning channel project in the world. The Robertson Creek facility was later converted to a hatchery and has proven highly successful in producing chinook and coho salmon.

Because of early disappointments, hatcheries received little attention for several decades. But during the 1970's, the focus on hatcheries was renewed. Following a pilot hatchery constructed on the Big Qualicum River to test new techniques, the first modern large-scale salmon hatchery in British Columbia was completed in 1973 on the Capilano River near Vancouver. This \$3 million project, producing coho and chinook salmon and steelhead trout, is considered to be one of the most successful hatcheries in the world. A second hatchery, costing \$5.2 million, was built on the Quinsam River near Campbell River. The most recent was built on the Puntledge River near Courtney and opened earlier this year. Several new hatcheries are now under construction.

THE SALMONID ENHANCEMENT PROGRAM

In the mid-1970's experiments with lake fertilization (or enrichment) in Great Central Lake appeared to be spectacularly successful, thus motivating government and industry to accelerate efforts toward a major enhancement program.

Early in 1974, the Department sponsored a policy development seminar in Vancouver to examine the opportunities for increasing production of salmonids (i.e. salmon and anadromous trout). Participants included representatives of the fishing industry, the academic, scientific and financial communities as well as federal and provincial officials. The assembly concluded that a cost-recoverable program to increase the production of salmonids to historic levels was feasible and that such a program should proceed immediately.³

The following year the federal Cabinet authorized the expenditure of \$6 million over two years for the development of a comprehensive enhancement plan, and also authorized the Minister of Fisheries to enter into an agreement with the Province of British Columbia to implement cooperative planning. Later in 1975 the federal Minister of Fisheries and the Environment and the provincial Minister

of Environment signed a Memorandum of Understanding dealing with arrangements for cooperation in formulating an enhancement program.

In 1977 the federal Minister of Fisheries announced a two-phase Salmonid Enhancement Program aimed at doubling the stocks of salmon and anadromous trout to their former levels of abundance, implying an increase in annual production of 150 million pounds. From the beginning, the second phase was to be dependent upon the success of the first. The formal agreement between the Minister of Fisheries and Oceans for Canada and the Minister of Environment for British Columbia was signed on March 1, 1979.⁴

Program Objectives

The Agreement is designed to facilitate cooperation between the federal and provincial governments in the planning and implementation of the program. It states that

... Canada and British Columbia agree that the Salmonid Enhancement Program must be so designed as to be capable of achieving specified economic, social, and environmental goals; taking into account and fully respecting the legitimate interests of other natural-resource users; ...⁵

Thus, while the purpose of the program is "to preserve, rehabilitate and enhance natural salmonid stocks", this is considered to be a means of achieving certain specific economic and social objectives, namely:

1. to augment national and provincial income;
2. to create employment opportunities for Canadians;
3. to improve economic opportunities for Native Peoples;
4. to foster development of economically disadvantaged communities and regions; and
5. to increase and improve recreational opportunities.

The Agreement also calls for a high degree of public involvement and a "vigorous program" to foster public awareness of the need to conserve salmonid resources and their habitats. The ultimate goals of the program are thus clearly specified.

The governments agreed that the program would be carried out in two phases. Phase I, as initially intended by the federal government, was to be a five-year program running from 1977 to 1982, but was subsequently extended by two years to 1984. For this phase, the federal government has committed \$150 million and the province \$7.5 million, "subject to funds being made available by the Parliament of Canada and the Legislature of British Columbia."

The production target for Phase I is to increase the catch of salmon by 50 million pounds annually. To achieve this, a wide range of techniques are provided for:

1. restoration of freshwater habitat, involving stream rehabilitation and removal of obstructions;
2. fishways to assist migrating fish past barriers to upstream spawning areas;

3. artificial spawning channels to provide optimum conditions for reproduction;
4. hatcheries and other incubation systems to increase the productivity of spawning fish; and
5. lake enrichment to increase the rearing capacity of natural lakes for young salmon.

Two other provisions of the Agreement are particularly important: the provision that both governments recoup their expenditures on the program through levies on users of the resource; and the provision that the two governments refrain from investing in the fisheries to ensure that the potential economic gains from increased fish production are not dissipated in higher costs.

Organization

The joint Agreement provided for the Salmonid Enhancement Board, which gives advice to the federal and provincial Ministers on the general direction and management of the Enhancement Program, and on annual budget allocations. The Board consists of three federal and two provincial senior officials, and seven non-governmental members. And, with the exception of provincial members, all are appointed by the Minister of Fisheries and Oceans. The non-governmental members are chosen for their special expertise in resource management and are not intended to be delegates of any particular interest group.

The Board receives advice regarding the Program's general direction from the Salmonid Enhancement Task Group, which consists of twenty-seven members and represents various interest groups and regions in British Columbia. Sportfishermen, native Indians, commercial fishermen and processors, other resource industries and tourist groups are among those represented. It is funded by the Salmonid Enhancement Program and maintains an elected Executive Committee and an Executive Secretary. The Chairman is a member of the Salmonid Enhancement Board and thus provides an avenue of communication between the two bodies.

The Enhancement Program is carried out by an Executive Director, who reports jointly to the Assistant Deputy Minister of Fisheries and Oceans and the Chairman of the Enhancement Board. Staff and resources are provided under a special Treasury Board allotment, described in Chapter 13.

This structure and its separation from the line operations of the Department's Pacific Region reflects the special character of the Enhancement Program: it expends funds from two governments, and must report to both; it is funded by special allocations, which are scrutinized closely by the Treasury Boards; and the Program is intended to be cost recoverable.

Designing the program of enhancement activities begins with individual project proposals, which are then grouped into alternative program plans, on the basis of their "enhanceability," "manageability" and "desirability." First, to determine "enhanceability", staff biologists and engineers

investigate potential projects to establish the adequacy of water supplies, land sites, brood stocks and other physical requirements to determine the project's feasibility, cost and potential production.

Then, to determine "manageability," each project is examined by one of the three Geographic Working Groups for the north coast, south coast and Fraser River areas. These groups, comprised of senior federal and provincial biologists, district supervisors and habitat protection officers, assess proposals in terms of their potential adverse impacts on other stocks, and recommend appropriate modifications. The "desirability" of projects is then assessed, largely by economic evaluation of their cost-effectiveness and regional impacts.

Enhancement Targets and Achievements

Consistent with the economic and social objectives of the program noted earlier, the following specific targets were established for the first phase:

1. to increase the average annual production of fish by 50 million pounds, the composition of this increase to be as follows:

sockeye	9.0 million pounds
chum	28.9 million pounds
pink	3.8 million pounds
coho	2.4 million pounds
chinook	5.7 million pounds
steelhead and cutthroat trout	0.2 million pounds;
2. to achieve an overall ratio of benefits to costs of 1.5:1, with a net contribution to the national income of 325 million in 1980 dollars;⁶
3. to provide benefits of 200 million in 1980 dollars in the "target area," which is British Columbia excluding the Lower Mainland and southern Vancouver Island region;
4. to provide the equivalent of 64 person-years of continuing employment for Indians; and
5. to generate 458 person-years of new employment in the construction and operation of enhancement facilities.

These targets were based on the assumption of a federal commitment to the program of 150 million in 1976 dollars over a five-year period. However, the allocations to Phase I will be 150 million in current dollars, spread over a seven-year period. As a result, these funds are now expected to provide purchasing power equivalent to only 78 million in 1976 dollars, or about 52 percent of that originally envisaged. The achievements of the Program must be compared with the targets in this light. By the end of the 1981/82 fiscal year, about \$105 million of the \$150 million budgeted by the federal government for Phase I will have been expended, and the remainder is expected to be spent over the following two years.⁷ In addition, about \$4 million of the Provincial funding will have been expended by the end of the 1981/82 fiscal year.

Fish production According to reports of the Salmonid Enhancement Program, at the end of March 1981, projects with a capacity to produce 27.7 million pounds of adult fish were already completed or operating. This new capacity is in the form of 10 major and 15 minor facilities, 14 community development projects, about 100 small projects, the varied efforts of some 7000 volunteers, and fertilization of nine lakes.

The species composition of this production is indicated in Table 11-1. About half of the total increase is in sockeye salmon, which is largely the result of success in lake fertilization; a substantial part of the remainder is in chum salmon, reflecting successful adaption of Japanese-style chum hatcheries.

Table 11-1 Targets and expected production for Phase I

species	target	production capacity March, 1981	estimated production capacity by end of Phase I	expected target achievement
	— millions of pounds —			percent
sockeye	9.0	13.5	18.6	206
chum	28.9	8.7	13.5	46
pink	3.8	1.6	3.7	97
coho	2.4	0.9	1.8	75
chinook	5.7	2.7	4.7	82
steelhead & cutthroat	0.2	0.3	0.4	200
total	50.0	27.7	42.7	85

Source: Unpublished data provided by the Department of Fisheries and Oceans.

By the end of Phase I, in 1984, the capacity to produce 42.7 million pounds annually is expected to be in place. This is 85 percent of the target for the first phase, and represents varying expectations for individual species as shown in Table 11-1. Given the eroded purchasing power of funds to a little more than half that on which the targets were based, the Program's achievements in terms of fish production are highly satisfactory.

Economic performance Current estimates by officials of the Salmonid Enhancement Program suggest that Phase I will ultimately generate net national income benefits of 77.5 million in 1980 dollars, about one-quarter of the original target.⁸ (In the remainder of this chapter many of the costs and benefits are expressed in 1980 dollars for consistent comparisons of value.)

The overall benefit:cost ratio is also expected to be lower, at 1.3:1. Benefits to the "target area" will be about 40 percent of the original target, at \$78.3 million. The estimated continuing employment that will be provided to Indians is 32 person-years, or half the target. And the employment generated in constructing and operating enhancement facilities is estimated at 623 person-years, exceeding the target by more than one-third. These projected results and the original targets are given in Table 11-2.

Table 11-2 Anticipated economic achievements of Phase I

program component	government cost	net national	benefit:cost ratio
		income benefits	
millions of 1980 dollars			
major projects	94.8	78.0	1.4
lake fertilization projects	9.0	48.5	2.4
minor projects ^a	15.0	-7.3 ^b	0.6 ^b
community development projects	21.2	-4.8	0.8
public participation projects	0.5	0.9	1.9
provincial projects	11.3	-10.2 ^b	0.1 ^b
total ^c	179.5	77.4	1.3
original target	211.5 ^d	325.0	1.5

Source: Unpublished data from the Salmonid Enhancement Program.

^a Includes minor engineering projects, small stream improvement projects and pilot projects.

^b Expected production from some projects in these categories beyond Phase I is excluded and therefore the net benefits and benefit:cost ratios are understated.

^c Includes unallocated overhead costs of \$27.7 million.

^d The estimated purchasing power in 1980 dollars, of the funds expended during Phase I.

The lowered expectations for national income gains, "target area" benefits and employment of Indians is partly attributable to the shrunken purchasing power of the funds available for the program. But there are other reasons as well. The estimated contribution to the national income has been reduced because the cost of harvesting and processing the enhanced production has been revised upward on the basis of new information. In addition, resources have been diverted toward enhancing depressed chinook stocks and away from projects that promised higher economic benefits.⁹ Furthermore, rising construction costs in British Columbia, and indications that bids on 1981 projects may be in the order of 20 percent higher than anticipated, have led to higher cost estimates and hence lower net benefit estimates.

However, several unexpected developments have had beneficial economic effects. Lake fertilization has emerged as an exceptionally economic means of enhancing sockeye production (at least if the results obtained in the Great Central Lake experiment can be replicated elsewhere), Japanese-style chum hatcheries have proven more successful than anticipated, and community development projects have been effective in involving Indian communities with high unemployment. Furthermore, a substantial volunteer labour force has been marshalled so that these projects have been undertaken at low cost.

Table 11-2, which gives the program components of Phase I, reveals a number of significant features:

1. major engineering projects are expected to account for over half of both the cost and the gains in net national income;
2. lake fertilization, while absorbing less than 10 percent of the government costs, is expected to account for almost

all of the remaining contribution to the national income, and yields by far the greatest economic return per dollar expended;

3. minor projects (small-scale engineering projects, small stream improvement projects and pilot projects) appear to be considerably less attractive than most other types of projects from an income generating point of view;
4. community development projects almost break even in terms of benefits and costs, and economically are as good as, if not better than, minor projects as a means of producing fish. This is significant in view of the objectives other than fish production to which much of the funds expended in this category are directed. For example, almost half of the government resources committed to these projects are absorbed by a complementary training program.

These preliminary results have important implications for designing future enhancement plans.

Public participation and education As already mentioned, the Program was intended to generate a high level of public participation in both planning and implementation, and to make a significant contribution to public education. The degree of public participation is reflected in the more than 7,000 volunteers who have worked on enhancement projects. Numerous meetings with interested public and fishing groups have been held, including two extensive rounds of public consultations, and significant expenditures have been made on information and education.

Emerging Problems

The revised expectations for Phase I suggest that its accomplishments in terms of fish production will be very satisfactory in relation to the funds expended. Moreover, the Program promises to be a beneficial investment, though somewhat less beneficial than originally projected. Social objectives and public involvement and education have also been served. Nevertheless, the Program has raised deep apprehensions.

Impact on wild stocks Probably the most widespread concern is whether artificially enhanced stocks will result in the destruction of natural stocks, frustrating the apparent gains. The large, artificial enhancement projects, especially hatcheries, are so successful that the stocks are sometimes increased by hundreds of thousands of fish. And the productivity of spawners is so high that only a small fraction of the stock is required for spawning. The problem arises when these enhanced stocks mingle with wild stocks as they are being fished, which often happens. To oversimplify a complicated biological problem, the fraction of wild stocks that must be left to provide adequate escapement is often several times greater than is required for hatchery stocks. As a result, when the enhanced stock is fully harvested, intermingled wild stocks are reduced in roughly the same proportion and are thereby depleted. So for natural stocks, the pressure of overfishing (discussed in Chapter 2) is aggravated.

The federal-provincial Salmonid Enhancement Agreement apparently foresaw this threat:

enhancement of one stock could result in a detrimental effect on other natural stocks as a result of the the increased fishing effort for the enhanced stock.¹⁰

Some observers fear that this process of depleting wild stocks could result, in the end, in simply replacing wild stocks with enhanced stocks. This is alleged to have happened in Oregon, where intensive enhancement was followed by an alarming decline in production. The cause of this phenomenon is complicated by oceanographic and other changes, and some biologists doubt that a similar outcome is likely in Canada. Nevertheless, the management of enhanced production to avoid adverse effects on natural stocks remains one of the most complex and controversial issues of the Enhancement Program.

Artificial versus natural enhancement A related and equally vigorous controversy surrounds the Program's current emphasis on large projects and the production of "artificial" stocks particularly from hatcheries:

Today, the key debate within the salmonid enhancement field is whether to launch the large scale projects and its attendant artificial stocks or to concentrate on massive comprehensive small scale rehabilitation . . .¹¹

From the beginning, major engineering projects were emphasized as Table 11-3 indicates. There are several reasons for this. First, large hatcheries and other artificial facilities are very productive because they provide control over waterflows and other physical conditions and thus can achieve a very high egg-to-fry survival rate and hence a larger production from a given supply of spawners, thus contributing effectively to the central goal of the Enhancement Program. In addition, there are substantial economies of scale. For example, to build three small hatcheries on different streams, rather than one large one with the same total capacity, requires nearly three times the expenditures for water works, bank protection and trapping facilities for adult fish, as well as additional operating costs. As a result, large artificial facilities are relatively more cost-effective.

The pressure to achieve a high economic return is considerable. The concern of the Treasury Board is revealed in the following statement:

There was a general estimate at our meeting that on the basis of present overhead, a benefit cost ratio of 1.6 is probably required before a given project should be undertaken. This is an important point on which to focus the on-going controversies between biologists, engineers and economists in the matter of project selection.¹²

The emphasis on large hatcheries and other major projects is consistent with the present importance of economic

considerations in the Program's objectives. The alternative is to revise the objectives.

Second, a hatchery is sometimes the only practicable means of enhancing or rehabilitating a stock. This was the case, for example, on the Capilano and Puntledge Rivers, where dams made natural spawning grounds inaccessible.

Third, hatcheries provide an alternative when increased escapement to the spawning grounds is difficult to achieve. While spawning habitat offers considerable scope for increasing Fraser River stocks of chinook salmon, for example, fisheries managers have been unable to achieve the increased escapement needed to use the capacity. The alternative is to produce more young fish from the available spawners, and hatcheries offer a means of doing this.

It has also been suggested that the enhancement program would have had difficulty proceeding on the scale it did and as quickly as it did without considerable emphasis on large engineering projects. Initiating many small projects would have taken considerable time because staff would have to have been recruited and trained, and projects investigated and organized, while plans for several large projects were already prepared. The federal-provincial Agreement notes that

Development plans for many of these sites have progressed to the stage where they can be implemented now, with reasonable assurance of success, in order to conform to the proposed Program schedule.¹³

Large scale projects do not always result in "artificial" stocks, of course; mention has already been made of major fishway projects which have opened access to natural spawning grounds. However, the most promising of these have already been built and the scope for additional projects of this kind is limited.

Nonetheless, testimony at the public hearings has revealed strong and widespread support for a shift in emphasis toward protection and rehabilitation of wild stocks, and more balanced enhancement by means of more numerous and geographically dispersed projects aimed at stream rehabilitation and improvement.

Some fear that artificial enhancement will disturb the genetics of fish populations through selection, reducing their diversity and resilience, and increasing their vulnerability to disease and predation. Large scale fish production works also raise risks of devastating accidents. Thus one expert has recently warned:

At the present time, hatcheries are demonstrably able to produce pink, chum, coho and chinook salmon (but not sockeye, which are notoriously sensitive) that are ready for seaward migration and that will subsequently come back as adults in sufficient numbers to make the operation ostensibly profitable using short term and narrow criteria.

When the evaluation of hatcheries is expanded to consider their impact in the long term on wild stocks most hatchery operations are still highly suspect. In addition to the conscious and unconscious selection of fish of particular kinds with its genetic implications for future generations the release of hatchery fish in large numbers has major ecological impacts on wild fish stocks.¹⁴

Finally, many advocate small scale projects to enhance natural stocks because they lend themselves better to public participation. The involvement of volunteers in such projects has already been noted, and spokesmen for commercial and sportfishing groups have indicated that potentially there are many others who would like to participate in enhancement work. Schoolchildren and environmental organizations have also proven that they can contribute usefully as volunteers, and enhancement work for prisoners has been demonstrated to be constructive in rehabilitating offenders as well as fish resources. This kind of broad public involvement could make a substantial contribution not only to resource development but also to more sensitive public attitudes toward fish and their environmental requirements.

pattern. Table 11-3 shows that the allocation to major projects has been significantly reduced and the allocation to minor projects, community development projects and public involvement significantly increased.

Species balance A number of commentators have criticized the distribution of enhancement effort among the salmonid species. Sportfishermen, particularly, have suggested that certain species, especially chinook, coho, steelhead and cutthroat trout, have received short shrift in favour of the more exclusively commercial species.

Table 11-1 compares the initial targets set for each species with the expected production. The increase in expectations for sockeye is conspicuous, and is due almost entirely to the remarkable success of lake enrichment projects. Initial enrichment programs have shown very high productivity at very low cost; thus sockeye is now expected to account for 44 percent of the enhanced production in Phase I at less than 10 percent of the total cost. Enhanced production of steelhead and cutthroat trout is expected to exceed initial targets also.

Table 11-3 Planned and actual allocation of federal funds among program areas^a

	original plan ^b		expenditures to March 1981		estimates to end of Phase I	
	millions of dollars	percent	millions of dollars	percent	millions of dollars	percent
major projects ^c	92.4	65.1	37.8	48.3	69.8	46.5
minor projects & community dev. projects	10.9	7.7	11.9	15.2	25.4	16.9
operation of facilities	8.9	6.3	3.9	5.0	20.1	13.4
reconnaissance and evaluation	21.7	15.3	13.2	16.9	17.2	11.5
public involvement	1.9	1.3	3.0	3.9	5.1	3.4
program direction	6.2	4.3	6.1	7.8	9.0	6.0
research	0	0	2.3	2.9	3.4	2.3
total	142.0	100.0	78.2	100.0	150.0	100.0

Source: Salmonid Enhancement Program

^a Provincial program and Department's contribution to operate pre-program facilities not included.

^b From financial estimates in the original federal Cabinet approval, 1977.

^c Includes lake fertilization and pilot production.

However, the benefits of this kind of enhancement are not as readily quantifiable as the highly visible production from a hatchery or spawning channel. And small projects, too, are vulnerable to risks; a sudden freshet, for example, can undo months of rehabilitative work on a stream.

While both large facilities and small projects likely have a place in a well-designed program, there is no obvious, simple answer to what the appropriate balance is. The criteria and methods used for assessing potential projects must be constantly reviewed to ensure that all benefits and costs are adequately considered, including those that are difficult to quantify.

In any event, as a result of these concerns about the orientation of the Enhancement Program, the direction of expenditures has changed considerably from the original

Production of other species of salmon are not now expected to reach the original targets. The projection for chum has been revised downward the most; projections for chinook, coho and pink production are not greatly below the original plans. As noted earlier, the purchasing power assumed in establishing the original targets has been eroded by almost half; in this light, the currently projected production of all species exceeds expectations with the exception of chum salmon.

Apparently, some funds originally intended for chum production were redirected toward producing coho, chinook and sockeye. Except for sockeye, the relative cost of producing each species is not available, but the unit cost of chinook and coho is significantly higher than the others.

The imbalance in production relative to the original plan therefore appears to be mainly in the two commercial spe-

cies, sockeye and chum. Of course, the question of the appropriateness of the original targets is still open and warrants careful review in future planning.

Effectiveness of lake fertilization The expected achievements of Phase I rest heavily on the results of lake enrichment for sockeye production. Early results from fertilization of Great Central Lake have produced high expectations for this technique, but this optimism is not shared by all scientists. Some are concerned that the remarkable results from early experiments may be due, at least in part, to natural ecological phenomena. In view of the major role that lake fertilization now plays in the plans for the Salmonid Enhancement Program, this is an issue that deserves careful research and evaluation.

Funding The federal government's original plans and objectives for the Program were based on a budget of \$150 million to be expended over five years. These funds were subsequently supplemented by a commitment from British Columbia of \$7.5 million, but the term for Phase I was extended to seven years.

The erosion of funding to the estimated 52 percent of the purchasing power on which the initial plans were based, is due mainly to inflation which was not adequately predicted. Other factors have been the additional increase in construction costs and the added drain on the budget from operating costs of facilities over the extended period. In addition, the federal government's new emphasis on contracting out has raised the cost of projects. The effect has been a significant reduction in the Program's strength, which has been a matter of much criticism, exemplified by the comments of the Task Group:

A very clear list of priorities for successful resource development was backed by public agreement, yet what do we see today? Political intervention — time extension — financial cut-backs — unfulfilled promises — no allowance for inflation — in short a lack of belief in the Program by those politicians and senior bureaucrats the public has shown its willingness to support. Such disregard for public opinion, research information, field experience and public knowledge leaves us confused, and certainly frustrated.¹⁵

In authorizing the program in 1977, the federal Cabinet directed that it be cost recoverable, although I understand that the Treasury Board agreed that up to 15 percent of the cost would not be recoverable in recognition of social and other objectives of the plan. Accordingly, in 1977 the Cabinet approved a plan to recoup costs from sportfishermen and the commercial fishing industry. The levies were to be introduced in 1978.

Provincial levies on freshwater sportfishermen have been raised in the form of license fees for some time, but it was not until this year that the first levies were imposed by the federal government in the form of a saltwater sportfishing

license fee. The Minister also announced an intention to levy a charge on commercial landings in 1982 if conditions permit.

The public hearings have revealed a diversity of opinion on the question of recovering the costs of enhancement. Some have argued that, where rehabilitation is required, those who have damaged the habitat should bear most or all of the cost. Others have suggested that fishermen should not be required to contribute until the increase in fish supply is available to them. And there is much controversy about how charges should be levied. Nevertheless, there is a broad base of support among sport and commercial fishermen for the principle that those who will benefit directly should contribute to the cost of resource enhancement.

The delay in implementing federal cost-recovery measures has diminished enthusiasm for contributing to the cost of Phase I, however; the funds have already been mostly expended, and in a way that cannot now be influenced. I refer to scope for contributions from the commercial fishery to the Salmonid Enhancement Program in Chapter 6, and I shall examine the alternatives more thoroughly before writing my final report.

Organization and administration Two concerns are expressed about the current organization of the Enhancement Program. One regards the structure of the Board and Task Group and especially the relationship between them. In effect, one advisory group advises another advisory group, and while each is concerned with important and worthwhile issues, their lines of responsibility are awkward and deserve reconsideration.

The other issue regards the separation between the Salmonid Enhancement Program and the rest of the Department of Fisheries and Oceans. The arrangement has drawn criticism on grounds that it impedes smooth-working relations and thus interferes with the needed integration of enhancement with habitat protection and fisheries management.

Some concern focuses on field activities, especially the employment of Community Advisors solely for the Salmonid Enhancement Program. Critics suggest that Community Advisors are too few and too isolated from general fisheries administration.

The program of Community Advisors would be shifted to DFO from SEP and would be substantially increased to cover all major B.C. communities/geographic areas with salmonid resources. The Community Advisors would be an integral part of District Fisheries Regions and Sub-Regions and would coordinate, with sufficient funds and staff, public involvement opportunities.¹⁶

These organizational questions must be examined in the context of the whole structure of fisheries administration, discussed briefly in Chapter 13.

Enhancement of stocks subject to foreign interception As a matter of policy, enhancement on streams that produce stocks subjected to significant harvesting by foreign fleets has been deferred. This includes the Nass and Skeena Rivers and streams that run through the Alaskan panhandle, which produce fish exploited partly by Alaskan fishermen, and sockeye and pink salmon on the Fraser system where catches are divided equally between Canada and the United States by international agreement.

These rivers offer excellent opportunities for enhancement, and the delay in taking advantage of them has been vigorously criticized by some participants.

We can see no good reason to delay any enhancement projects which may produce salmon subject to interception. (i.e. Fraser, Skeena, Nass systems). Such delay obviously detracts from our negotiating stance, and becomes only an "opportunity lost" in respect to production value, and in evaluating systems capability when considering alternate use of habitat.¹⁷

The most attractive opportunities for enhancement are on the Fraser River for pink and sockeye stocks. The International Pacific Salmon Fisheries Commission estimated in 1972 that sockeye catches could be increased by 36.6 million pounds and odd-year pinks by 24.5 million pounds through enhancement.¹⁸ Moreover, many of these projects show high benefits in relation to costs. But half the benefits would accrue to the United States under present arrangements.

Constraints on the realization of projected benefits The joint federal-provincial Agreement that provides the framework for the Enhancement Program perceptively provides for an undertaking on the part of the two governments to "... restrain the primary and secondary sectors of the commercial fishing industry from incurring unnecessary capital investments which could dissipate the benefits to be generated by the Program."¹⁹ They also agreed to develop and implement a plan to "restrain unwarranted investments" by January 1980.

The initial economic evaluations of the projects in Phase I were based on the assumption that redundant investment in the fleet would be controlled so that costs would not increase; and a similar assumption underlies the current calculations of economic benefits discussed above. However, as explained in earlier chapters of this report, governments have failed to constrain investment in fishing capacity. The indicated economic benefits of the Enhancement Program must, therefore, be regarded as only potential, and cannot be realized unless new and effective means are found to control wasteful investment in fishing capacity.

Planning for Phase II The Salmonid Enhancement Board has indicated its satisfaction with the achievements of Phase I by recommending in their 1979/80 report to the federal and provincial Ministers that planning should proceed for Phase II. It recommended expenditures of \$22.5 million

over three years, and the federal Cabinet has recently allocated \$4.5 million for initial planning expenditures.

In proposing objectives for Phase II, the Board concluded that the original goal of restoring catches to historic levels (i.e. by 150 million pounds of salmon) was still valid in terms of the capacity of the ecosystem. Accordingly, it suggested an objective for Phase II of increasing annual production by 100 million pounds through enhancement projects over a ten-year period. Significantly, this recommendation is predicated upon improvements in habitat management and in the management of fishing activity.

OCEAN RANCHING AND AQUACULTURE

A considerable controversy has developed over the prospects of ocean ranching of salmon on the Pacific coast and about the opportunities for fish farming and shellfish culture. In this preliminary report, I confine discussion to a brief sketch of these issues.

Ocean Ranching

Ocean ranching refers to the artificial propagation of salmon by private parties who release them to the sea and harvest them on their return as adults. This technique was first practiced in Oregon, where there are now 12 ocean ranching operations, owned mostly by large corporations. In Alaska, fishermen and other industry groups who can benefit from the resulting harvest have developed ocean ranching operations on a non-profit basis.

So far, ocean ranching has not been permitted in Canada, though several groups, including the British Columbia Development Corporation, have indicated a keen interest in initiating projects and view this as an attractive and self-financing supplement to the Salmonid Enhancement Program.²⁰ It takes advantage of the homing instinct of salmon, permitting them to graze at large in the ocean until those that survive return to be harvested.

Opposition to ocean ranching has several sources. First, some object to the practice as an undesirable break with the tradition of treating fish as a common property resource; this obviously implies some assumptions about the harvesting rights of the rancher and the most beneficial way of organizing the fisheries. Second, some fishermen fear that in order to ensure sufficient fish return to the rancher, their access to traditional stocks may be curtailed. Third, biologists have warned of genetic threats to wild stocks from undesirable interbreeding with artificially propagated fish and of the possibility of communicating diseases. Finally, the experience with ocean ranching in Oregon has not been altogether satisfactory, and the experience with pink and chum salmon in Alaska is too short to provide much assurance of success.²¹

All these problems can be clarified with research and experience. Ocean ranching may offer substantial opportunities for fisheries development in the long run, and it would be imprudent to reject them out-of-hand at this early stage. Clearly, the experience elsewhere deserves to be watched

carefully, and any experiments here should proceed cautiously, without prejudice to established fishing interests. Information about ocean ranching is accumulating rapidly, and I shall return to this question in my final report.

Fish Farming

Fish farming differs from ocean ranching insofar as it refers to the propagation and raising of fish within confined areas or structures. In other parts of the world, fish farming has been practiced for centuries, and today aquaculture accounts for a significant fraction of the world's production of food fish.²²

On Canada's Pacific coast, fish farming is confined mainly to rearing salmon and trout in fresh and tidal waters. Over the last decade, the number of licensed operations has more than doubled to 91 in 1980. Ten of these produce salmon, and sales of cultured salmon have grown from almost nothing to 147 tonnes during the last five years. Most is produced by three operations that produce pan-sized fish for retail food stores.

In addition 77 licenses were issued for trout farming in British Columbia, and land sales of cultured trout have expanded to 56 tonnes in 1980. The market is dominated by a large producer, who specializes in pan-sized fish for sale in the Vancouver area and in the production of fingerlings for fishing ponds and other operations.

Information about the market prospects for the products of fish farming is sparse, but the recent expansion of operations suggests that opportunities exist. Presentations at the public hearings, and several recent studies, indicate several obstacles to the development of this fishery.

1. Governmental red tape. Freshwater fish-farming operations are currently administered by the Province. Finfish culture in tidal waters is licensed by the federal Department of Fisheries and Oceans but requires a provincial permit when conducted on shores owned by the Province. Processing and marketing falls within provincial jurisdiction. And several provincial and federal agencies are responsible for water works, land development and other matters. Operators complain of extraordinarily complicated regulatory arrangements and confusion about responsibilities, which leads to burdensome delays and financial risk.
2. Heavy working capital requirements. The one- or two-

year interval between the commitment of capital and the production of marketable products, combined with the limited equity in most of these small operations, deters lenders from providing loans to support these ventures.

3. Insecure egg supply. Salmon culturists are dependent on the Department of Fisheries and Oceans for their needed supplies of salmon eggs, but the aquaculture permit provides no assurance that egg supplies will be available, and recurrent difficulties are encountered in obtaining requirements.
4. Other problems relate to the susceptibility of confined fish to diseases, and to interference by other industrial activities with the sensitive water-quality requirements.

Oyster Culture

The oyster industry is based on the Pacific oyster, introduced from Japan early in this century. In 1980, oyster production totalled 1,799 tonnes, with a landed value of about \$1.1 million. Most production takes place in Georgia Strait, but small quantities are also produced on the west coast of Vancouver Island. In recent years commercial production has declined.

About 75 percent of the harvest is from intertidal grounds leased from the Province. The remainder is from "wild" oysters harvested under provincial permits that carry a nominal fee. The wild stocks support a lively recreational fishery as well; the size of the recreational harvest is unknown but is probably substantial on the more accessible beaches. Oyster producers sell their product to retail stores, restaurants and fish processing companies. About two-thirds are sold in western Canada and the remainder in the United States.

The declining trend in world supplies of oysters suggests that the long term market prospects for west coast producers are good. Recent estimates suggest that production from raft culture in Georgia Strait could be increased by roughly 50 times the current annual production through new suspension culture techniques.²³

The obstacles to development of the oyster culture industry are similar to those faced by finfish culturists. In addition, of the 30 or more existing major oyster lease holders more than 20 do not have economically viable operations because of inadequate seeding. If seed supplies were increased, production on existing leases could probably be doubled or tripled.

FOOTNOTES

1. P.A. Larkin with Appendices by B.A. Campbell and C.H. Clay, Play it again Sam, an essay on salmonid enhancement, Journal of the Fisheries Research Board of Canada, 31(8). Ottawa, 1974. p. 1433-1456.
2. For a historical commentary, see A.W.H. Needler, Evolution of Canadian fisheries management towards economic rationalization, Journal of the Fisheries Research Board of Canada, 36(7). Ottawa, 1979. p. 716-724.
3. Government-Industry Policy Development Seminar on Resource Enhancement, Fisheries and Marine Service, Department of the Environment. Vancouver, 1974.
4. Federal-Provincial Agreement: Salmonid Enhancement Program. Memorandum of Agreement signed by the Minister of Fisheries and Environment for Canada and the Minister of Environment for British Columbia. March 1, 1979.
5. Federal-Provincial Agreement, p. 2.
6. The original targets were set in 1976 dollars and have been converted to 1980 dollars using the Consumer Price Index.
7. "The Salmonid Enhancement Program," a background paper prepared by the Department of Fisheries and Oceans and presented to the Commission, August 1981.
8. Source: Economic Advisor, Salmonid Enhancement Program. These results are not the same as those contained in the Department of Fisheries and Oceans' submission to the Commission, because they reflect revisions made since that submission was prepared.
9. Also, some resources may have been diverted towards projects in the "target area" to obtain a more desirable distribution of benefits, at the expense of projects which were capable of generating more income.
10. Federal-Provincial Agreement, Annex "B", p. 3.
11. Exhibit # 138, p. 0-1.
12. Letter from the Program Analyst of Treasury Board to the Department of Fisheries and the Environment. March 3, 1981.
13. Federal-Provincial Agreement, Annex "A", p. 2.
14. P.A. Larkin, "Is it wise to plan to manage salmon populations making a distinction between wild and 'hatchery' stocks?," 1978. p. 23.
15. Exhibit # 102, p. 1.
16. Exhibit # 88, p. 4.
17. Exhibit # 98, p. 8.
18. Proposed Program for Restoration and Extension of the Sockeye and Pink Salmon Stocks of the Fraser River, International Pacific Salmon Fisheries Commission. New Westminster, 1972.
19. Federal-Provincial Agreement, p. 7-8.
20. Exhibit # 100.
21. Carmel Finley, Hannema reverses stand on ocean ranching, The Fisherman's News. Seattle, 1981.
22. T.V.R. Pillay and Wm. A. Dill, Advances in Aquaculture, Fishing News Books Ltd. Farnham, 1976.
23. D.B. Quale and D.W. Smith, A Guide to Oyster Farming, Department of Recreation and Travel Industry. Victoria, 1976.

Part Five

Management And Administration

CHAPTER 12

Fisheries Management

"It is not enough to say that the fisheries will be managed for the greatest benefit of those in the industry and for Canada. We must know what that means in operational terms."

FISHERIES COUNCIL OF CANADA¹

The conservation and management of fish resources entails two fundamental responsibilities. One is preservation of the habitat that fish depend upon, the subject of Chapter 10. The other is the protection of the stocks under pressure of harvesting, which is the subject of this chapter. I have already drawn attention in this report to repeated "failures" in fisheries management that have resulted in resource depletion. Most dramatic have been the collapse of herring stocks and the severe declines in halibut, but undoubtedly the greatest losses have occurred through protracted overexploitation of salmon stocks.

The basic goal of fisheries managers is the same for all stocks: it is to regulate harvesting so that adequate numbers of spawners are left to provide for maximum sustainable production.² But this objective has proven difficult to achieve. Managers have been frustrated by insufficient knowledge of stock sizes and population dynamics, heavy pressure from competing groups of fishermen, inadequate control over fishing activity and natural disturbances that are only vaguely understood. Management performance and problems vary considerably among fisheries, and so each must be considered separately.

SALMON MANAGEMENT

The main objectives of salmon fishery management are to ensure adequate escapement to the spawning beds and to enable the harvest of the rest of the stocks. A supplementary objective is to distribute the harvesting as evenly as possible over the stocks as they pass through the fisheries, so as to protect the genetic characteristics that govern their productivity and timing. In addition, managers attempt to allocate the available catch among the sectors of the commercial fleet, the sport fishery and the Indian fishery. However, apart from the general priority of the Indian fishery described in Chapter 8, there are no clear operational objectives to guide this allocation. Also vague is how much atten-

tion is to be paid to the value of the catch taken in alternative ways and locations.

The general procedure followed in salmon management begins with pre-season estimates of stock abundance for each major fishery, based on past history, information about the parent spawning stock, environmental conditions and any other available information. These estimates are used to set tentative harvest objectives, intended to achieve the desired spawning escapement. In a few fisheries test-fishing provides information for modifying the targets, and fishing activity and catches are monitored for the same purpose in all fisheries. Openings and closures are manipulated by area and gear, and final adjustments are made by regulating the catch of the last, most inshore fishing activity.

Fisheries managers face three major uncertainties in carrying out these regulatory procedures. First, they seldom know with much confidence how many fish will enter the fishery or how many have already escaped. Pre-season estimates are rarely accurate, and the size of a run is usually not known until most of the fish have passed through the fisheries. Second, they cannot reliably predict the time when the stock will enter a fishery. The timing of runs varies from one cycle to the next, and yet the bulk of a stock can pass through in only one or two weeks. Third, they do not know how many vessels will participate in an opening. The highly mobile fleet that has developed in the salmon fishery responds quickly and often unpredictably to fishing opportunities along the coast. Sometimes managers refrain from declaring openings for small runs because of the threat of an excess of fishing effort being directed to the available stocks. In addition to these persistent uncertainties, management problems arise because stocks move along the coast in varying patterns. Fish of different stocks mingle in many of the areas most intensively fished, so that it becomes difficult to manage each stock individually.

A stock is most precisely identified as a population that spawns at a particular site at a particular time. But there are thousands of such stocks returning to the rivers and streams of the Pacific coast, so management must be aimed at collections of them. In some cases, stocks are defined by large rivers of origin, such as the Nass or Skeena River sockeye. In other cases the management unit is a mixture of stocks that spawn in a collection of rivers in a single statistical area.

Fish may be harvested in several areas during their migrations. For example, Fraser River sockeye may pass through fisheries off the Queen Charlotte Islands, off the West coast of Vancouver Island and in Johnstone Strait as well as the Fraser River. In these cases the catch in one fishery is not independent of the catch in others, and this creates obvious difficulties in attempting to achieve a harvest target, especially since patterns of migration vary from year to year.

Two or more stocks passing through a fishery at the same time give rise to the "mixed fishery" problem, referred to briefly in the preceding chapter. The most important mixed

fishery occurs in the gauntlet of Johnstone Strait, where stocks bound for local streams, Georgia Strait, the Fraser River and the United States are fished together. The fraction of a stock required for escapement varies; it is much lower for sockeye than for pinks, for example, and especially low for hatchery stocks of any species. But in mixed fisheries the stocks cannot be fished discretely; and so, inevitably, some of the smaller and less productive stocks are depleted while some of the more productive are underharvested.

In-season Management

Faced with these uncertainties and difficulties, fisheries managers attempt to regulate salmon fishing to meet escapement targets. With pre-season forecasts and targets, proposed fishing patterns are developed and, for the net fisheries, the number of days fishing per week required to achieve the targets are estimated. All these forecasts, targets and proposed fishing patterns are revised weekly as fishing proceeds.

New information is continuously assembled during the fishing season. Catches are monitored by "hailing" packers and fishing vessels on the fishing grounds. Information on escapement is more difficult to obtain; test-fishing provides some data on numbers of fish that have passed through the fisheries, but only on the Fraser and Skeena Rivers and in a few other areas is this practice sufficiently consistent to yield reliable estimates of escapement. There are also attempts to estimate the size of runs yet to enter the major fisheries. But the main information for the guidance of fisheries managers during the fishing season is the relative size and trend of the runs as indicated by catches from week to week. The full size of the runs cannot be reliably estimated until their peaks have passed.

Once a decision is made to declare an opening, further decisions about its duration and subsequent openings are made on a day-to-day basis in light of current estimates of catches and stock sizes. The available data are typically weak, so that decisions rest heavily on the judgement of Fisheries Officers.

Professional management biologists are assigned to the major fisheries to assist in the interpretation of information and offer advice to the Fisheries Officers. Smaller fisheries receive less professional attention, and the Fisheries Officers usually have little information to guide them. In these cases they often know only the current catch performance of vessels (the catch-per-unit-of-effort), and on this basis they decide whether the apparent stock densities justify openings or closures.

The salmon troll fishery has not hitherto been regulated as intensively as the net fisheries, but there have been two recent examples of in-season regulation. Troll fishing for pink salmon has, in some cases, been restricted to the same openings that have applied to net fishing, and certain areas (notably Swiftsure Bank) have been closed to reduce catches of immature chinook and coho salmon. The monitoring and management system for regulating these closures is still being developed.

Possibilities for Improvement

Regulatory agencies and fishermen generally agree that present provisions are inadequate for the task of proper management of the salmon fisheries. There is insufficient information to permit reliable assessments of stocks and escapements, inadequate staff and expertise to interpret data and make proper decisions, and a general deficiency in the controls available to regulate pressures on the stocks. Suggestions for improvement have been made in considerable variety, and are summarized here.

Stock information Management of the salmon fishery depends critically on up-to-date information about the size of stocks and the timing of their passage through fisheries areas, but the quality of this kind of data is usually very weak. Expert advisors to this Commission have emphasized that better information systems would yield substantial benefits. Escapements could be managed more effectively, with consequent improvements in the stocks, and harvesting could be regulated with closer attention to the yield capabilities of particular stocks so that fuller utilization could be achieved. The gains in increased production could be substantial.

The best way to obtain this information is through a systematic program of test-fishing and tagging to monitor the movement of fish along the coast. Vessels with specially designed gear, fishing in strategic locations, could provide advance estimates of the size and timing of major stocks moving toward the fishing areas, and thereby enable improved planning and management decisions.

There are various ways such test-fishing could be organized through special fishing licenses or contracts with the Department. The Commission's advisors suggest that the potential gains in harvests would justify allocation of a significant portion of the catch to a test-fishing program, perhaps 5 or 10 percent, which could nevertheless allow increased harvests in the commercial fishery. These possibilities obviously deserve to be explored carefully.

Consideration should also be given to an expanded log-book program for the salmon fishery, such as that in Alaska in which fishermen record and report details of their catches and other information. With suitable provisions to ensure confidentiality, this could provide valuable management information at relatively low cost.

Spawner information The preceding discussion of fisheries regulation procedures emphasized the crucial importance of escapement in guiding the decisions of fisheries managers. It follows that measures of escapement are needed to judge the success of fisheries management as well as to estimate the abundance of the next generation. A frequent criticism is that, apart from the assessments of pink and sockeye escapements conducted by the International Pacific Salmon Fisheries Commission on the Fraser River, present enumerations of spawner escapements are seriously deficient.

The Department's field staff routinely inspect streams during the spawning season to estimate numbers of

spawners. Records have been kept since the mid-1930's and today more than 1,200 salmon streams are enumerated. Estimates are made by visual inspection from the ground or from aircraft and, in turbid rivers, test-fishing is sometimes used.

The apparent inaccuracy of these estimates is disturbing. Checks based on tag and recapture techniques indicate that they are sometimes in error by several-fold. Moreover, the annual counts seem to vary with the staff who make them, and reappraisals have produced large discrepancies. All this has undermined confidence in spawner estimates, and suggests an urgent need for improvement.

An obvious weakness is that, apart from the few rivers equipped with counting fences, there is no standardized counting or sampling procedure for Fisheries Officers to follow, nor are there prescribed observation sites to ensure consistency. Thus, suggestions have been made to develop more rigorous and consistent procedures for enumerating spawners. In addition, other techniques, such as the rigorous assessment of a few representative streams, which has been adopted with some success in Washington State, may yield more useful information than is now obtained.³

Data processing Related to the requirement for better resource information is the need for expeditious compilation, interpretation and communication of it. Currently, information flows to and from different fisheries during the fishing season in a rather haphazard way. However, modern computer technology offers promising opportunities for much faster and more systematic data gathering and analysis.

In 1970, a regional salmon statistics committee recommended a complete overhaul of the statistical collection and storage system, and a similar recommendation was made by a team of consultants last year.⁴ Sophisticated techniques, involving computer terminals in the field to enable assessment of statistical information and the consequences of alternative management actions, have been developed elsewhere and may provide useful models for adaptation here.⁵

Reorganization of fishing: terminal fisheries Terminal fishing implies different things to different people. To some, it means harvesting the stocks as they arrive at their spawning sites, which in some cases are hundreds of miles upstream. Indian fisheries are sometimes of this kind, and the harvesting of sockeye at the counting fence on Babine Lake on the upper Skeena system provides a commercial example. Other hatcheries on the coast also harvest excess stocks in this way. To others, terminal fishing means harvesting the fish at the mouths of rivers as they leave the sea. And to others, it means simply moving the commercial fleet further inshore.

An increasingly popular proposal for improving salmon management, discussed by many participants in the Commission's public hearings, involves shifting the commercial fisheries inshore toward the river mouths. This proposal is supported on two grounds: it would improve the economy

of fishing by eliminating the need for a large offshore fleet, and it would enable more discriminating management and harvesting of discrete stocks as they approach their spawning grounds. In addition, it would restrict fishing to only mature fish, and hence increase production.

However, this approach has certain difficulties and limitations. First, a fishery at the mouth of a river would sometimes be a mixed fishery, with all its attendant problems. On the Fraser, for example, a fleet exploiting other stocks with conventional nets would endanger weak stocks of chinook and steelhead. Second, because salmon often "pool" or wait several days at the mouth of a river before moving upstream, regulating the catch of a large fleet at this point could be more difficult than regulating the catch of a fleet exploiting a stock moving through a fishing area over a span of time. The problem would be compounded if information about the stocks is weak. So, managing terminal fisheries probably would require much better resource information than is now available. Third, some species of salmon, particularly chum, deteriorate in quality as they approach their spawning streams, so some of the economic advantages of terminal fishing would be offset by diminished product value.

Notwithstanding these difficulties, terminal fishing appears to hold some promise for fisheries management. But there has been surprisingly little study of the opportunities, and the variety of possibilities for directing fisheries to stocks further along their migration routes appear to warrant investigation to throw more light on the debate surrounding this issue.

Other changes in the organization of fishing and in the structure of fishing fleets would assist in resource management. Clearly, a substantial reduction in the fleet's size would facilitate management and reduce the adverse impact on escapements of errors in decisions. Area licensing would eliminate some of the present uncertainty about the size of the fleet likely to converge on any opening. But the feasibility of such changes will depend on other considerations, discussed elsewhere in this report. More modest proposals for improvement include closer coordination of openings in different areas to spread the fleet, and clarification of allocation objectives to prevent pressures from various sectors interfering with escapement targets.

My review of the salmon management system has led me to conclude that improvements are urgently needed. This is not a criticism of the Department's management staff; indeed, I am surprised that they manage so well with the meagre resources available to them. But in view of the increasing pressures on the stocks, improvements must be made, and I am convinced that the techniques for effecting these improvements are available.

HERRING MANAGEMENT

When herring were exploited mainly for the reduction industry, management was guided by the principle of maxi-

mum sustainable yield. The collapse of stocks after 1965 led to a reassessment of management methods and provided valuable information about stock responses. Today, the approach to herring management is much more cautious. Target levels of escapement or spawning are fixed in advance of fishing, and the fishery is regulated with the objective of harvesting only the excess over the escapement targets.

The major challenge in herring management is the regulation of the roe-herring industry. (The catches in the food, bait and other herring fisheries are relatively small.) The roe-herring fishery is short and intense and exploited by a fleet with enormous excess capacity (described in Chapter 5), characteristics which make this fishery difficult to regulate with much precision.

For purposes of roe-herring fishing, the coast is divided into three broad management zones; the north coast, the Strait of Georgia, and the west coast of Vancouver Island; the licensing system divides the fleet among these zones. Within these zones, 34 specific herring areas have been identified; these are the effective management units, where fishing openings are declared if sufficient spawning stocks appear. Some units are only an inlet or bay; others, especially in northern waters, encompass a broad range of coast.

For each area, a desired escapement is determined by the Department's Resource Services Branch at Nanaimo. The Fisheries Officer in charge of the area normally accepts this as his objective and attempts to regulate fishing to harvest any surplus.

A month or so before herring are expected to spawn, patrol vessels and chartered fishing vessels use echo-sounders to locate and assess the size of stocks. Usually, the number of tons of fish gradually increases prior to spawning, and daily estimates are telexed to the Department's offices for the information of fishermen. As fishing vessels assemble in a fishing area, fishermen also sound for fish, supplementing the information collected by the Department's vessels.

The timing of fishing is crucial in this fishery; harvests must be taken just before the fish spawn, and for this purpose samples of the stock are taken to measure roe content and ripeness. Fisheries Officers must restrain the fleet until the appropriate moment, often under heavy pressure from fishermen. To control the rate of harvest openings are often very short, usually first for seine vessels and later for gillnet vessels.

Problems and Alternatives

In-season management of the hectic roe-herring fishery is exceptionally difficult. The first problem lies with the assessments of stock abundance. Echo-location is a difficult technique, and interpretation of readings is a skill that can be acquired only with experience. Because the roe-herring industry is new, and turnover among Fisheries Officers has been high, this critical element in management has often been clouded by uncertainty.

A second problem results from the variability of apparent abundance from day to day, which makes sound management decisions difficult even with reliable readings. This problem has led to the suggestion that harvest targets be expressed as a percentage of the stocks. This would reduce the onus on estimates of the total stock size but would require more judicious regulation of open areas and times to achieve the desired level of exploitation.

Crucial management information is obtained from estimates of herring spawn; post-season spawn surveys along shorelines where herring deposit their eggs begin as soon as fishing ends. The results provide an assessment of management performance and estimates of future stocks.

Techniques for measuring herring spawn have gradually been improving. Between 1950 and 1970, catch and spawn data were compiled for some 50 areas, and since then the number has doubled. But clearly there is much scope for improvement in these surveys. Also needed are better techniques for verifying pre-fishery estimates of stock abundance with information about catch and escapement, and for estimating population recruitment from spawn.

GROUNDFISH MANAGEMENT

Management of halibut stocks is the responsibility of the International Pacific Halibut Commission, described in Chapter 5. I have not investigated the management practices of the Commission, except to note the high regard for the Commission's work expressed by all who have commented on it. A typical assessment is that of a recent study for the Economic Council of Canada:

Suffice it to say that the fisheries community generally regards the scientific work of the Commission as highly professional; its statistical records of the fishery are among the most complete to be found anywhere in the world; and it has operated without any indication of bias or partizanship toward one country or the other. As a matter of judgement, the opinion might be ventured that much of the strength of the Commission in dealing with fishermen and processors (and the general willingness to comply with its recommendations) reflects confidence in the professional ability and integrity of its staff work and the openness with which the results of that work are discussed with the several sectors of the industry concerned.⁶

Other groundfish, managed by the Department, are less problematical than salmon and herring. The biological and behavioral characteristics of these species are simpler; and because they have not attracted the heavy fishing pressure of the major fisheries, managers have been able to proceed more cautiously in regulating harvests. As noted in Chapter 2, relatively modest demands on the stocks and conservative management policies have, with a few exceptions, protected the stocks from depletion.

The Department has made a creditable effort to maintain records of groundfish catches and fishing activity, voluntary logbook records and some stock information since the 1940's. More recently, following the extension of fisheries jurisdiction, a much more vigorous program of research has been directed toward these species. A research team is now rapidly expanding information about stocks and evolving systems for establishing allowable harvest levels in advance of probable growth in demand for these resources.

Management of the groundfish fishery begins with publication early in the year of a Pacific Coast Groundfish Management Plan, which informs the industry of the groundfish quotas for each management area. The objectives are to allocate the available stocks among the fleets licensed to fish groundfish and to spread the catch over the year as evenly as possible. Quotas may be revised as the season progresses, but yields are generally much more stable than in the salmon and herring fisheries. This year, special permits were issued to fish groundfish northwest of the Queen Charlotte Islands in an effort to obtain improved information about stock abundance.

There are few conspicuous problems in groundfish management and the Department appears to have prudently set out to prepare for heavy exploitation before it occurs. The only general concern expressed by the Commission's advisors is that the data on stocks and yields under low exploitation rates may not provide adequate information to guide managers when the stocks are subjected to heavy harvesting. This has led to suggestions for experimentation with less conservative harvesting policies in order to improve knowledge about population dynamics for future management.

MANAGEMENT OF INVERTEBRATE STOCKS

The management of shellfish and other invertebrates is aimed generally at achieving maximum sustainable yields for the commercial, and in some cases, Indian and recreational fisheries. A variety of regulatory techniques are used, but because the stocks are numerous, small and widely scattered, they do not receive as intensive management as other fisheries.

Heavy exploitation of abalone in recent years has led to the imposition of quotas, described in Chapter 5; and quotas have been introduced for geoducks, sea urchins, zooplankton and, in some areas, shrimp as well. Other regulatory techniques include closed seasons, closed areas, gear restrictions and size limits. To regulate sport catches, managers rely mainly on size restrictions and possession limits. Commercial landings are monitored through sales slips and in some cases through compulsory catch logs.

Generally, management of these minor species has been based on sparse information about stock sizes and productivity, and so it has been exploratory in nature. These fisheries offer excellent opportunities for experimentation with innovative forms of licensing and tenure arrangements, as well as alternative harvesting policies that would identify maximum potential yields without going through the usual process of overexpansion and general stock depletion. Moreover, biological research would undoubtedly improve the prospects for maintaining yields and, in view of the fact that the value of landings in these minor fisheries has approached that of groundfish in recent years, greater attention to their management appears to be warranted.

CONCLUDING OBSERVATIONS

Present systems of fisheries management have evolved pragmatically in response to the circumstances of various fisheries, the kind and quality of information that can be obtained and the controls available to managers. While these systems have worked with mixed success, they will likely be inadequate in the future as the value of resources and pressures on them increase. In addition to the specific suggestions already noted, several general improvements are needed.

One is the need to improve information about stock abundance for in-season management of the highly volatile salmon and herring fisheries. This may justify a fairly intensive program of test-fishing, involving strict scientific control of the methods of fishing and interpretation of results. Another is the need to improve the system of data processing and analysis to yield more systematic and timely information for field officers. A third is the need to increase the management expertise available for the in-season regulation of the major fisheries. Fisheries Officers now carry exceedingly heavy responsibilities for managing the fishing industry, and they often lack sufficient experience or training in estimating procedures and statistical interpretation. They also lack sufficient data processing facilities to enable them to make the sophisticated decisions that are increasingly demanded of them. And a fourth is the need to increase scientific input into management decisions. The involvement of scientific and research personnel in groundfish management, however, is exceptional.

There appears to be a need for more professional involvement in the within-season management of the major fisheries. Concomitantly, a more systematic documentation of the basis for decisions and a more thorough evaluation of their effectiveness would promote the accumulation of valuable management experience. I intend to investigate these opportunities further for my final report.

FOOTNOTES

1. Exhibit # 91, p. 7.
2. It should be noted that the size of a population of fish that will produce the maximum sustainable yield is smaller than the maximum population size, which can be maintained only without exploitation. See W.E. Ricker, Stock and recruitment, Journal of the Fisheries Research Board Of Canada, 11. Ottawa, 1954. p. 559-623.
3. See D. Ludwig and C.J. Walters, Measurement errors and uncertainty in parameter estimates for stock and recruitment, Canadian Journal of Fisheries and Aquatic Sciences, 38(6). Ottawa, 1981. p. 711-720.
4. DPA Consulting Limited, Review of Pacific Region Statistical System Final Report. A report prepared for the Department of Fisheries and Oceans. Vancouver, 1980.
5. Decentralized data processing systems of this kind have been developed in Ontario and in Washington State. For a discussion of the latter, see S. Wright, Contemporary Pacific salmon fisheries management, North American Journal of Fisheries Management, (1). Lawrence, 1981. p. 24-40.
6. The Public Regulation of the Commercial Fisheries, a report prepared for the Economic Council of Canada by the Economics Study Group at the University of British Columbia, 1980 (publication pending).

CHAPTER 13

Administration, Consultation, Enforcement and Research

"... government often attempts to do too many things for too many people at the cost of neglecting its most serious responsibilities, and government often attempts to under-finance and under-staff those most important elements of its mandate which often have a low political profile."

THE FISHERIES ASSOCIATION OF BRITISH COLUMBIA¹

The government's success in fulfilling its mandate in managing fish resources and their use depends first on a suitable framework of legislation, regulations, policies and objectives; and second on the provisions for administration and enforcement to implement these. In this chapter I review the federal government's provisions for administering fisheries policy on the Pacific coast, its consultative structure, and its commitments to enforcement and research.

These are matters that have attracted a great deal of critical commentary in the Commission's public hearings. Each of them is a complicated issue in itself, deserving detailed investigation. I have not yet had an opportunity to study them in detail or to discuss them with Department officials in a public hearing. So this chapter only sketches the present arrangements and identifies some of the suggestions that have been made to improve them, with the purpose of facilitating further discussion.

ADMINISTRATION

The federal Department of Fisheries and Oceans in the Pacific Region is responsible for the entire Pacific coast of Canada (including offshore islands) to the 200 mile limit, the mainland of British Columbia and the Yukon. Through international fisheries treaties, the Department is involved as well in the management of fisheries in extraterritorial waters in the Pacific and Arctic Oceans and in the Bering Sea. Administration of freshwater fish has been delegated to the Province of British Columbia, leaving the federal authorities responsible for all other resources and for commercial, Indian and recreational fishing in this vast area.

Basic Responsibilities

The Department's basic responsibilities are set out in the federal Department of Fisheries and Oceans Act, under which it is directed to administer a number of statutes.² On

the Pacific coast the most important of these are the Fisheries Act, Fisheries Development Act, Fish Inspection Act, Fishing Recreational Harbours Act, Coastal Fisheries Protection Act and the Fisheries and Oceans Research Advisory Council Act. In addition, the Department is involved with five international commissions on the Pacific: the International Pacific Salmon Fisheries Commission, the International Pacific Halibut Commission, the International Tuna Commission, the North Pacific Fisheries Commission, and the Fur Seal Commission. The Department's role in the Salmonid Enhancement Program is based on a Federal Cabinet decision and a Federal Provincial Agreement described in Chapter 11. In all, the Department is involved with some 90 statutes and supplementary regulations.

The Department of Fisheries and Oceans has primary responsibility over fisheries and over ocean science and surveys for all of Canada. The Pacific Region of the Department is one of six in the country, the other regions being Newfoundland, Gulf, Scotia-Fundy, Ontario and Western (the Prairie Provinces and Northwest Territories). Two Assistant Deputy Ministers divide responsibilities for these regions geographically, one taking responsibility for Quebec and the Atlantic, the other for Ontario and western Canada including the Pacific Region. The Ocean Science and Surveys component of the Department operates under a separate Assistant Deputy Minister more or less independently from fisheries in the Pacific Region. The responsibilities of a fourth Assistant Deputy Minister include marketing, industrial policy and international matters.

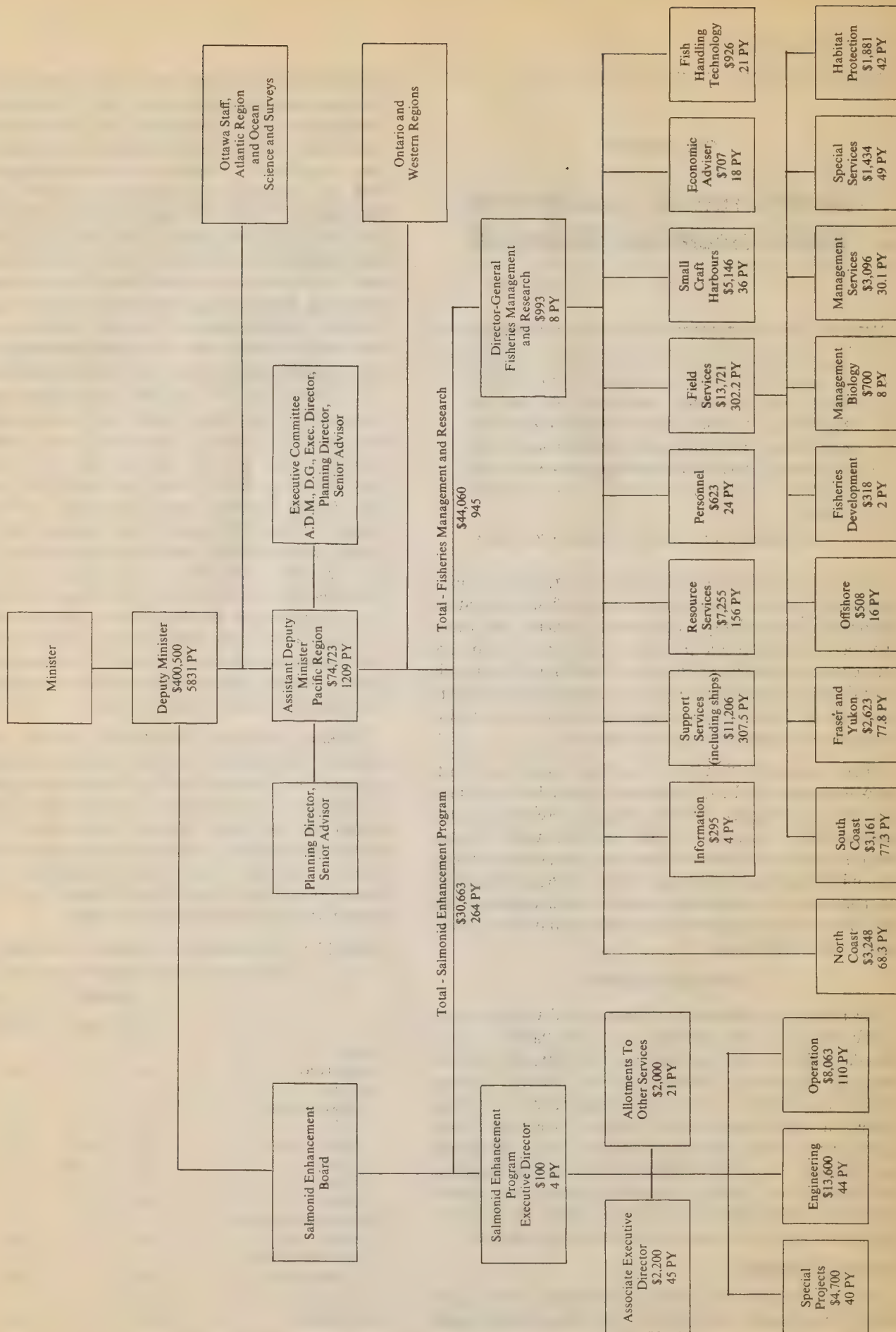
Fisheries, as distinct from Ocean Science and Surveys, accounts for about 83 percent of the Department's annual budget of \$402 million for all of Canada, and approximately 77 percent of its manpower requirements. The fisheries budget for the Pacific Region, currently at \$75 million, accounts for roughly a third of all regional expenditures and almost a quarter of total fisheries' spending. Table 13-1 breaks down the Department's budget and manpower requirements for the 1981-82 fiscal year.

Table 13-1 Department of Fisheries and Oceans national allocation of budget and manpower, 1981-82

	manpower		budget	
	person-years	percent	millions of dollars	percent
<i>Fisheries</i>				
headquarters	507	9	108.2	27
regions				
Newfoundland	873	15	52.5	13
Gulf	213	3	12.6	3
Scotia-Fundy	1260	22	65.2	16
Ontario	126	2	7.6	2
Western	310	5	13.9	3
Pacific	1209	21	75.0	19
<i>Ocean Science and Surveys</i>				
Pacific region	298	5	14.8	4
other regions and headquarters	1035	18	50.7	13
<i>total Fisheries and Oceans</i>	5831	100	400.5	100

Source: Department of Fisheries and Oceans.

Figure 13-1 Department of Fisheries and Oceans, Pacific Region organization and resources in 1981-82
(budget figures in thousands of dollars; PY denotes person-years)



Organizational Structure of the Pacific Region

Since 1980, the Pacific and other regions west of Quebec have been grouped together under the responsibility of one of the Department's four Assistant Deputy Ministers. Under him in the Pacific Region are two main organizational lines as shown in Figure 13-1, one for the Salmonid Enhancement Program and the other for Fisheries Management and Research.

The development and functions of the Salmonid Enhancement Program were explained in Chapter 11. It is headed by an Executive Director, who is responsible to both the Salmonid Enhancement Board, chaired by the Deputy Minister, and to the Assistant Deputy Minister, who oversees the Program's operations. About \$31 million, or over 40 percent of the Region's budget, is allocated to the Salmonid Enhancement Program.

Table 13-2 Geographic distribution of personnel in the Pacific Region of the Department of Fisheries and Oceans, 1981-82

	headquarters units total: 669						field units total: 540								
branch	Van- couver	Tech- nology Services Laboratory	Pacific Biological Station Nanaimo	West Vancouver Labora- tory	Kam- loops	New West- minster	Nanaimo	Port Alberni	Campbell River	Victoria	Kitimat	Prince Rupert	Queen Charlotte City	White- horse	total
director-general	8.0														8.0
information	4.0														4.0
economics & statistics	18.0														18.0
personnel	24.0														24.0
technology		21.0													21.0
special services:															
ships	7.0		27.0			19.0	4.0	8.0	11.0	81.0	13.0	24.0	11.0		205.0
other	61.5		41.0												102.5
field services	140.1				15.0	58.8	45.5	13.5	14.4	6.9	17.0	44.3	9.0	6.0	370.5
resource services	2.0	1.0	127.0	26.0											156.0
small craft harbours	7.0					13.8	5.2	1.6		1.5	.5	5.7	.7		36.0
salmonid enhance- ment program	136.0		13.0	5.0	4.0	24.0	21.0	10.0	19.0	2.0	7.0	18.0	5.0		264.0
total	407.6	22.0	208.0	31.0	19.0	115.6	75.7	33.1	44.4	91.4	37.5	92.0	25.7	6.0	1209.0

Source: Department of Fisheries and Oceans

The structure of the Fisheries Management and Research program is far more elaborate. Its functions are divided among four geographic groups (Offshore; South Coast; North Coast; and Fraser River, Northern British Columbia and Yukon), and it consists of a host of line and functional support groups. Fisheries Management is headed by a Director-General and accounts for the remaining \$44 million, almost 60 percent, of the Region's budget.

The geographical distribution of the Region's 1,209 personnel is heavily weighted towards headquarters and staff functions, as shown in Table 13-2. At headquarters units in Vancouver and Nanaimo, 669 people are employed. Of the 540 employed in the field units, 230 are involved directly with fisheries management, including 125 Fisheries Officers. The remaining 310 are assigned to various special services such as ship's crews, operation of enhancement facilities and small craft harbours.

An executive committee consists of the Assistant Deputy Minister responsible for the Pacific Region, his Senior Advisor, the Director-General, the Executive Director of the Salmonid Enhancement Program, and the Director of

Regional Planning. This committee meets regularly, mostly over questions of policy.

Expenditures and Budgeting

The pattern of expenditures in the Pacific Region is depicted in Figure 13-1. Of the \$75 million regional budget for the 1981-82 fiscal year, \$30 million is slated for salaries, \$27 million for goods and services and \$18 million for capital expenditures.

Standard parliamentary and Treasury Board procedures monitor and restrict spending to ensure that expenditures and employment of personnel are consistent with predetermined budgets. Resources may not be transferred between programs without special authorization. Other controls restrict the extent to which staff at various levels may commit public funds.

During 1977 and 1978, when fisheries was under the Department of the Environment, an attempt was made to carry out a critical review of all programs in the Department. Known as the "A-base Budget Review," it was to identify inefficiencies and duplication of functions, and to evaluate the benefits realized from the resources committed to various programs. Although the review was completed for most other components of the Department, it was deferred for the Fisheries' Pacific Region because of a reorganization taking place there at the time. To date no comprehensive review of this nature has been completed for the Region.

Reorganization and Instability

A striking feature of the Department's experience during the past decade has been its repeated attempts to reorganize. This, in conjunction with changes in senior personnel, has produced an unstable administrative environment in the Pacific Region.

Before 1971, the Department of Fisheries was responsible for fisheries matters. In 1971, fisheries was brought under the umbrella of the newly created Department of the Environment, along with forestry, meteorology, wildlife, water and environmental protection.

Within the Department of the Environment, the Fisheries Service was headed by one of seven Assistant Deputy Ministers, but because of the wide variety of disparate agencies in this conglomerate Department, fisheries suffered from a lack of focus and attention at senior levels. This shortcoming was recognized, and in 1975 a Minister of State for Fisheries was appointed to share responsibilities for the Department of the Environment with the Minister of the Environment. In addition, the position of Senior Assistant Deputy Minister was created to head the Fisheries and Marine Service.

Three years later, in 1978, a separate Department of Fisheries and Oceans was created, in effect reversing the decision made seven years earlier to consolidate fisheries with other areas in the Department of the Environment. With this structure came the appointment of a Minister, a Deputy Minister and four Assistant Deputies.

While these developments were taking place, the Ottawa headquarters of the Department was expanding and becoming more heavily involved in Pacific Region decisions, with a corresponding dilution of influence by Regional officials. It has been suggested as well that the successive waves of structural change led to a preoccupation with internal administrative matters both in Ottawa and in the Region. During this period three different individuals held the position of Director-General (formerly called Director) for the Pacific Region, each of whom made significant organizational changes within the Region during his tenure.

The 1970's also saw the retirement of the large number of Fisheries Officers who had been recruited to the Region from the armed forces after World War II. The influx of less experienced replacement personnel added further administrative stress in the Region.

These administrative disruptions came at a time when the Department's ability to manage the fisheries resources of the Pacific coast was being challenged by a number of events. These included the extension of fisheries jurisdiction to 200 miles, the development of the Salmonid Enhancement Program, the explosive emergence of the roe-herring fishery, the accelerating increase in the catching power of fishing fleets, the growing interest and participation in sportfishing, heightened concerns associated with the Indian fishery, and increased public awareness of the sensitivity of fish habitat. The resources of the Region were tested as never before at a time of almost continual administrative upheaval and retrenchment. These events took their toll in loss of morale, staff turnover, and strains within the Department.

Issues in Administration

Many participants in the Commission's hearings criticized the Department's performance in conservation and management in the Pacific Region. Others were critical of the government's financial commitment to the fisheries. Still others focused on the inadequacy of personnel, on insufficient emphasis on the field as opposed to headquarters, and on insufficient training and experience among field personnel.

Some participants made suggestions for fundamental changes in government organization, including creating a separate Minister for Pacific fisheries, shifting more responsibilities from the federal to the provincial government, and undertaking other restructuring that would reverse a widely perceived orientation of the Department toward the Atlantic fisheries at the expense of the Pacific. However, relatively few specific comments were directed toward the administrative framework of the Department, perhaps because it is little understood. I expect to receive further information from the Department on this important issue and commentary on it before writing my final report. Nevertheless, my initial review of the organizational structure of the Pacific Region and its deployment of resources suggests to me a number of issues that deserve further investigation. These include the following:

1. The adequacy of the total resources of the Pacific Region. This is an exceedingly complicated question, difficult to analyse in isolation from other governmental responsibilities and constraints. It involves examination of the distribution of the Department's resources between Ottawa and the regions and among regions. This year the Pacific Region's fisheries budget, excluding the special allotment for the Salmonid Enhancement Program, is in the order of \$50 million, which is less than one-sixth of the Department's total fisheries budget and one-quarter of all regional allocations. The Pacific Region accounts for much larger shares of Canada's fisheries production.
2. The geographical location of the Assistant Deputy Minister responsible for the Pacific Region. This senior official was recently moved to Vancouver on an experimental basis, though the Minister, Deputy Minister and the three other Assistant Deputy Ministers are all stationed in Ottawa. This raises questions about the relative attention the Pacific Region receives in Ottawa and the lines of responsibility in Vancouver. The results of this experiment should be carefully evaluated.
3. The separate reporting line for the Salmonid Enhancement Program: the structure of this organization, and its working relationship to the Department's habitat management group.
4. The reporting line for the North Coast area. This area now reports directly to the Director-General rather than through the Field Services Branch like the other three areas.
5. The strength of the Department's habitat management group and the extent of its decentralization.
6. The adequacy of Fisheries Officer staff, the provisions for Community Advisors, and their reporting lines.
7. The administrative role of the Environmental Protection Service, its responsibility for the pollution control provisions of the Fisheries Act, and its location within the Department of the Environment warrant review.

8. The desirability of engaging outside consultants and contractors for Regional management, Salmonid Enhancement Program projects and other functions.
9. The centralization of research in the Resource Services Branch.

I have raised other matters of administrative organization in preceding chapters with respect to particular aspects of policy.

THE CONSULTATIVE PROCESS

In earlier parts of this report I emphasized the prevalence of conflict among those with interests in the fisheries. The commercial fleets are split into well-organized groups of vessel-owners engaged in different fisheries, which, in some cases, are further fragmented by gear sectors. The interests of these various groups frequently conflict, as do the interests of processing companies and fishermen. Furthermore, Indians, sportfishermen, the commercial sportfishing sector and others often have competing interests. And other industries, whose activities tend to impinge on fisheries and their habitats, are often pitted against all of these resource users.

The government must contend with these competing interests and respond to them. But at the same time, it must assert its responsibilities to the public at large, which implies more than simply balancing the special interests of users.

In an effort to take advantage of the experience of those who participate in the fisheries and to obtain their assistance in developing and implementing new policies, a host of informal advisory bodies have been formed in the Pacific Region over the years. They now number 16 and are comprised of volunteers drawn from various interest groups as well as Departmental officials.³

On the Minister's Advisory Council, eight senior representatives of the processing industry and fishermen from various parts of Canada provide general advice to the Minister and serve collectively as a sounding board for proposed policies. The Pacific Region Fisheries Management Council, with 34 members, was set up to assist the Department in matters common to most fisheries in this Region, particularly long-term management planning. This group has been inactive over the past year and its function appears to have been largely eclipsed by the Minister's Advisory Council.

The Field Services Branch of the Pacific Region has formed five Regional Committees, each consisting of about 10 members, to assist with fisheries management issues in specific localities, namely the Skeena River, Queen Charlotte Islands, Central Coast, Johnstone Strait (for chum salmon) and the Fraser River.

The Herring Industry Advisory Board and the Herring Spawn on Kelp Committee assist with the planning, management and development of herring fisheries. And the Groundfish Advisory Committee performs similar functions for groundfish.

The Sport Fish Advisory Board, with 21 members, including spokesmen for commercial sportfishing interests and recreationists, provides advice on tidal and non-tidal sportfishing issues. The Department calls on interested fishermen for advice in negotiating international fisheries matters such as the Canada-United States salmon interception problem and the offshore tuna fishery. The composition and roles of the Vessel License Appeal Board and the Salmon Vessel Buy-Back Committee are explained in Chapters 5 and 6; those of the Salmonid Enhancement Board and the Salmonid Enhancement Task Group are described in Chapter 11. In addition the Minister announced his intention to establish a Fisheries and Oceans Research Advisory Council.

These groups serve as forums for discussion, and they frequently recommend courses of action to the Minister or regional officials. But none of them has the authority to make binding decisions. Most are chaired by an officer of the Department.

Most of the commentary at the Commission's hearings on the structure and activities of these advisory committees was disturbingly critical. One participant referred to the communications between fishermen and the government as a "dialogue of the deaf."⁴ Another summarized typical complaints in the following terms:

Here in the Pacific Region we currently have a consultative process made up of a staggering number of representative sections, industry committees, governmental agencies, etc., all theoretically participating in the ongoing mechanisms of fisheries management. In reality we have near paralysis made up of endless bureaucratic reorganization, plain inertia, empire building, and, on the part of all — endless posturing. Positions are usually polarized and entrenched with a pervading reluctance to make positive proposals for fear they will be viewed as a sign of weakness. The D.F.O. actually seems to favour these fractionate conditions within the industry. The resulting frequent lack of consensus has repeatedly seen D.F.O. officials making arbitrary regulations that often are poorly thought out, poorly implemented and on occasion having no foundation in law. The D.F.O.'s credibility has been less than zero with much of the fishing industry for some time; and recent conduct involving regulatory decisions for the recreational fishery and licensing by area in the roe-herring fishery have only sunk opinion lower. A fundamental requirement of the immediate future is for the D.F.O. to get its act together.

Fishermen, user groups, etc. are themselves not totally guiltless, if for nothing other than manifestations of human nature such as greed, lack of concern for the resource and the aforemen-

tioned posturing on issues. There is unquestionably a need to raise the level of responsibility assumed by all participants in the industry.⁵

Other participants criticized advisory committees for rubber-stamping Departmental proposals and for serving as tokens of public relations. Some committees are considered to be too large to be effective, their proceedings futile and their objectives frustrated by friction among user groups.

A number of proposals have been made for improving the consultative process and deserve careful consideration. They include the following:

1. That a senior policy advisory council for the Pacific fisheries be established. Members of such a council might be representatives of the major interest groups or be appointed for their knowledge and experience and not be accountable to particular interests. Most suggested that such a body have broad responsibilities for reviewing policy and the activities of the Department of Fisheries and Oceans, including its program priorities, staffing and budgets, and report directly to the Minister.
2. That advisors be appointed for their abilities, not their affiliations. A common criticism is that members of advisory committees who are appointed to represent particular interests or on the recommendation of particular interest groups tend to use the committees as a forum for pressing their particular groups' interests, and inevitably find themselves unable to compromise as is often necessary to reach a consensus. To mitigate these difficulties, some suggest that members of such committees should be appointed for their knowledge and experience and without any implication that they are accountable to particular interests.
3. That fisheries management advisory groups be established. These groups would be responsible for advising the department on fisheries management and enhancement within particular geographic areas, structured along the lines of the Salmonid Enhancement Task Group.
4. That industry sector advisory committees be established. Those who believe that large advisory groups encompassing competing users cannot be effective sometimes advocate improved specialized advisory committees from particular sectors of the commercial fisheries.
5. That procedural arrangements be improved. Some commentators suggest that advisory committees could be made much more effective if the chairman was not a Departmental official, if the members had more influence on agendas, and if the committees were assigned support staff.
6. That a fishermen's calendar be established. This would prescribe annual deadlines for announcements of proposals or changes to provide for orderly discussion and preparation. A frequent criticism of the Department is that it announces new policies and regulations at unpredictable

times or at the last minute, leaving little opportunity for effective discussion with interested parties. A fishermen's calendar would alleviate this problem.

7. That communication with fishermen be improved. Consultation with members of an advisory committee may not ensure adequate communication with all the individuals with interests in the fisheries. Accordingly, it has been suggested that the Department should attempt to communicate its activities directly to fishermen and others through a widely circulated periodical. At present, the Salmonid Enhancement Program distributes widely a newsletter, the "Salmonid," with information about enhancement activities, and the Department produces the "Sounder" mainly for internal purposes. These information services might be revised to provide news of general developments in fisheries management to a broad audience.
8. That pre- and post-season reviews be established. Some participants believe that much could be gained by systematic discussions of fishing plans before each season with the fishermen in particular regions and by post-mortem assessments after the season ends. This would be an extension to the suggestion that regional advisory groups be established (point 3 above).

In view of the widespread dissatisfaction with present consultative arrangements and the obvious need to obtain the constructive advice of those engaged in the fisheries, improved approaches are urgent, especially now when significant policy changes are being contemplated. There is no doubt that the advice of those with knowledge and experience outside the public service can make a valuable contribution to the development and implementation of fisheries policy, and they are clearly anxious to do so. The problem is to design improved mechanisms for this purpose. Because consultation is costly and time-consuming for those involved, including Department officials, it is important that the structures and procedures be efficient.

ENFORCEMENT

Enforcing the regulations embodied in the Fisheries Act is an issue that cuts across most aspects of fisheries policy. Participants at Commission hearings expressed serious misgivings about the Department's performance in upholding the laws and regulations it administers. While I expect to canvass this topic in more detail before preparing my final report, I briefly review here the main problems that have been identified and some of the suggested solutions.

In previous chapters I have discussed enforcement in the context of specific management issues before this Commission. In Chapter 5, I pointed to suspension and cancellation of fishing licenses as valuable adjuncts to other remedies available to the Department. Difficulties now faced by the Department in enforcing Indian fishery regulations were identified in Chapter 8, and in Chapter 10 I discussed enforcement as it arises in habitat management. I do not intend to reiterate those observations here, or to raise other

enforcement problems relating to particular fisheries or specific management problems. Rather I discuss enforcement in general terms, bearing in mind however, that the nature of the task is shaped by the character of underlying policy. As policies change, so do the demands on enforcement capabilities.

Scope of Enforcement

Enforcement puts heavy demands on the Department of Fisheries and Oceans and, despite criticisms, a substantial budgetary commitment is made for this function. According to the Department, \$13.8 million, or 32 percent, of the Fisheries Management budget in the current fiscal year is directed toward conservation and protection, of which a major part is enforcement. But this is to provide for the Department's responsibilities over the entire Pacific Region, including surveillance of thousands of domestic commercial, Indian and sport fishermen over the whole coast, foreign fleets operating in offshore fisheries, and a wide variety of industrial and other activities along vast water systems.

The magnitude of this mandate is increased by the nature of the resources themselves. With valuable fish at stake, poachers can readily profit from the sale of illegally caught fish. And industrial activities that threaten fish habitat can benefit from avoiding costly measures to reduce damage to fisheries unless there are substantial penalties. In short, powerful economic incentives, at work over a huge area, run directly counter to the Department's responsibility to manage and conserve the resource.

There is no way of accurately estimating the incidence of violations or their associated costs, though one study estimated that illegally caught fish in the major commercial fisheries could account for as much as 10 to 15 percent of the value of reported landings.⁶ Even statistics indicating increasing or decreasing numbers of reported violations or convictions are not firm evidence of trends in illegal activities because they may well say as much about the intensity of enforcement effort and the success of prosecutions as about the incidence of crime. Nevertheless, Table 13-3 indicates that charges laid and associated convictions have risen somewhat over the past six years.

Table 13-3 Numbers of fisheries prosecutions in the Pacific region in recent years

year	charges	convictions	acquittals	stay	outstanding
1975	603	521	36	46	00
1976	887	776	42	69	00
1977	753	583	82	88	00
1978	1280	981	81	186	32
1979	1314	921	94	193	106
1980	1090	540	57	94	399

Source: "Enforcement," a background paper prepared for this Commission by the Department of Fisheries and Oceans, August 1981.

Organization of the Enforcement Effort

The Department's main enforcement effort is through its 125 Fisheries Officers posted throughout British Columbia and the Yukon, who are responsible for day-to-day activities in their areas. Many of these officials have received special enforcement training at the RCMP Training Academy in Regina since 1977. In addition, 19 Inspection Field Officers

are concerned principally with enforcing fish processing standards. Up to 50 Patrolmen and fish guardians are hired each season, and 150 ships' officers and crew are employed mainly as support staff for enforcement at sea and in the rivers and estuaries near the coast.

The Director of the Field Services Branch is responsible for four divisions in the Region whose activities carry enforcement obligations: three geographic divisions (the Fraser, Northern British Columbia and Yukon Division; South Coast Division; and Offshore Division) as well as the Management Services Division, which provides staff support to the field. Another Division, the North Coast Division, reports directly to the Director-General. Until March of 1981, when it was disbanded, the enforcement effort in the Region was supported by a General Investigations Unit that was available to carry out detailed investigations of complicated violations in all divisions.

Most prosecutions are initiated by Fisheries Officers who observe violations in the field. Recently an "Observe, Record and Report" program sponsored jointly by the British Columbia Wildlife Federation, the Department of Fisheries and Oceans and the Provincial Fish and Wildlife Branch has been developed to encourage the public at large to report violations.

Prosecutions under the Fisheries Act and regulations are the responsibility of the federal Department of Justice. For most prosecutions, the Department of Justice engages lawyers in private practice in the locality where the trial is to be held, though some are handled by lawyers on the Department of Justice staff.

The present Fisheries Act provides for maximum fines for violations ranging upwards from \$5,000 for most first offences, and as high as \$50 thousand for violating the "deleterious substance" provision for the first time. Second and subsequent offences carry maximum fines of double these amounts. Clean-up costs for "deleterious substance" violators may be assessed as well. With a few minor exceptions, no minimum fines are imposed by the Act. Table 13-4, which indicates the disposition of prosecutions over the past four years, shows that relatively few convictions have resulted in fines of greater than \$500.

Table 13-4 Penalties imposed in fisheries prosecutions in the Pacific Region in recent years

	1978		1979		1980		1981 ^a	
	number	percent	number	percent	number	percent	number	percent
dismissals,								
suspended								
sentences,								
absolute &								
conditional								
discharges	151	21	139	17	123	20	9	23
fines of less								
than \$100	352	48	402	49	255	40	11	28
fines of \$100	201	27	204	25	213	34	17	44
fines of more								
than \$500	24	3	74	9	36	6	2	5
jail sentences	9	1	1	0	2	0	0	0
total	737	100	820	100	629	100	39	100

Source: Department of Fisheries and Oceans.

^a As of June 1981.

Vessels and other equipment engaged in illegal fishing activities may be seized on the grounds and, in addition to any other penalties assessed, may be forfeited to the Crown at the order of the Minister or a court. While seizures are frequently made for poaching offences, forfeiture is rarely invoked except for nets and fish.

Objectives and Alternatives for Enforcement

The government's primary objective in enforcement should be to deter violators. It would be virtually impossible for the Department, deploying reasonable resources, to detect and apprehend all violators. Nevertheless, the enforcement effort can be reasonably successful if would-be offenders perceive a high likelihood of being apprehended and, on conviction, of stiff penalties. Enforcement policy must be designed to prevent anyone from viewing illegal activities as a low-risk means for enriching themselves at the expense of fisheries resources and of the public whose resources they are.

The techniques available for instilling these perceptions can be divided into two broad categories: detection, and prosecution and punishment. For each, certain possible changes appear worthy of consideration.

Detection A host of factors bear on the likelihood of detection. Obviously, the number of enforcement officers and their qualifications, mobility and visibility are key considerations. The assistance and cooperation they receive from the general public and from other resource users significantly influences their effectiveness. The following changes offer potential scope for increasing the Department's effectiveness in this area:

1. Allocating more personnel and resources, including equipment, to monitoring commercial, Indian and sport-fishermen, and land-based operations that threaten fish habitat. This proposal has been advanced by some who are critical of the Department's effectiveness in enforcement and calls for a larger financial commitment by the government.
2. Creation of a team of specially trained enforcement field officers whose responsibilities would not include other management functions now undertaken by most fisheries officers. A variation on this proposal would involve reinstating and perhaps reorienting the General Investigations Unit.
3. New policies and a support program to encourage fishermen and others to report violations to the Department. Payment of a bounty to those whose information leads to successful prosecution is one possibility. (There is already a provision in the Act for payment of one-half of any penalty imposed to the person who lays the information.) Another is reinforcing the Department's support for the "Observe, Record and Report" program mentioned earlier.

Prosecutions and penalties The high proportion of successful prosecutions — in the order of 80 percent — might

be due to capable prosecutors, or it could reflect a policy to lay charges only in cases where the prospect of success is high. The fines typically assessed are frequently criticized as far too low to serve as successful deterrents, perhaps reflecting a lack of appreciation by the courts of the seriousness of these offences in the aggregate to the community at large. Possible avenues of change in this area include the following:

1. Appointing and training a limited number of specialized prosecutors who would handle fisheries cases in the Region to enable prosecution of more suspects and well-informed pleas for higher fines. This group might be appointed either from within the Department of Justice or from private law practice.
2. Appeals of low penalties to higher courts could be pursued more vigorously.
3. The maximum levels of fines under the Fisheries Act could be raised, but, at least under current judicial attitudes as I perceive them, this might not assist significantly. Perhaps specifying minimum fines would be more effective; this would narrow courts' discretionary powers in levying fines and would eliminate altogether token fines for some offences.
4. For offences under the habitat protection provisions of the Act, an accused may be acquitted if the offence was committed by his employee and he can show that he exercised "due diligence" to prevent it. Removal of this avenue of defence would make convictions easier to obtain in some instances, and would encourage closer supervision of workers.
5. At present the Act focuses exclusively on the activities of persons, and I understand that prosecutions sometimes cannot be obtained because the individuals aboard a vessel cannot be identified due to boarding difficulties. One means for alleviating this problem might be to enable prosecutions against the holder of the fishing license under which the vessel is operating, regardless of whether or not he is physically on the vessel when the offence occurs.
6. Wider publicity could be given to successful prosecutions. This would add to the embarrassment of violators and provide examples for other potential offenders.

I intend to consider these and other suggestions before preparing recommendations for my final report.

RESEARCH

The terms of reference of this Commission do not explicitly direct me to enquire into fisheries research, but "the provisions for conservation, management, protection and development of fish resources including the protection of their tidal and non-tidal habitat" and "optimum rates of harvest" are all issues that imply a significant research requirement. Indeed, weak understanding of the biology of

the various stocks has plagued fisheries managers and repeatedly frustrated management as described in earlier chapters. In Chapter 12, in the context of fisheries management, I identified some specific research requirements; however, I do not intend in this preliminary report to canvass all of the ongoing and planned research activities in fisheries science, nor to make specific recommendations. But to focus further discussion, I will sketch recent developments in the organization of research effort and briefly review current arrangements.

Background

The need for Canada to conduct its own biological research into fisheries management was first identified before the turn of the century.⁷ In 1893, the federal Commissioner of Fisheries, Dr. E.E. Prince, concluded that Canada should attain a position of equality with other countries in marine and freshwater biological research. The Pacific Biological Station was established in 1908, and this marked the beginning of the federal fisheries research program on Canada's Pacific coast.

The earliest investigative fisheries work was largely descriptive, and often carried out by volunteers. The basic biology of salmon and other species gradually became understood, and the knowledge that is now largely taken for granted was worked out, often with painstaking effort.

Largely descriptive studies continued, with meagre financial support, until after the Second World War. At that time, the Fisheries Research Board, which had been created around the turn of the century, gained a new chairman, who did much to promote a favourable climate for a wide range of biological research. During the period of his chairmanship research flourished; both applied and basic research were supported, and many of the present fisheries management concepts were developed.

A new chairman was appointed in the mid 1960's, and there was a new shift in emphasis. Scientists were directed to work on more basic or experimental research and earn a reputation in fisheries science for Canada. This effort was successful, and the fisheries research conducted by Canadian scientists, already highly regarded, achieved higher international stature. But during this period, scientists of the Fisheries Research Board in Nanaimo received little support for analyzing the fish stocks of the region and maintaining long-term data bases. At about the same time, the Department's headquarters in Vancouver began to recruit their own biological staff to provide scientific support for test fisheries, tagging and sampling programs, and other projects related directly to fisheries management, habitat management and enhancement.

Within the last few years the federal government's fisheries research effort was reorganized, along with other changes in administrative structures. The Fisheries Research Board was dismantled and its staff was integrated with the Department. To replace it, the Fisheries and Oceans Research Advisory Council is now being created. As its name implies,

the Council will perform a strictly advisory function, and will not itself have research capabilities. Its membership will be drawn from federal government agencies, universities, fishing and related industries, and the general public, but the majority of members will be scientists.

At the same time two other changes were being made. One was increased emphasis on sociological and economic research; the other was a move toward contracting out research services rather than having the work done by Department staff. Along with these changes there were several tight budget years and budget cuts.

Today research work is carried out in the Resource Services Branch of the Department of Fisheries and Oceans, operating from two major research laboratories; the Pacific Biological Station at Nanaimo and the West Vancouver Laboratory. The resources available for research in the Pacific Region have shrunk in recent years as the burden of other responsibilities has increased without corresponding budgetary allotments, and a progressively larger portion of effort has gone into matters of immediate concern to managers. Moreover, all the recent organizational and policy changes have been disruptive, and have created an urgent need for an environment that will facilitate effective teamwork among research scientists, economists, biologists and managers, overcoming the past divisions among institutions and responsibilities.

Issues for Investigation

Several basic issues in the provisions for fisheries research need investigation:

1. The adequacy of budgetary allocations for research. Research is costly, but there is also a cost associated with inadequate knowledge. In recent years research allocations have diminished while the value of the natural resources to be managed has increased.
2. The balance of priorities between basic scientific research and applied research. Reconciling the objectives of the research scientist with that of the resource manager has been traditionally difficult. The former strives for thoroughness and the advancement of scientific knowledge, which often yields visible benefits only in the long term. The latter strives to meet the manager's needs, which can often be met by relatively superficial information.
3. The priority of economic and social science research. The emphasis of fisheries research has always been on biology and engineering. In recent years the Department has become increasingly caught up in industrial regulation, policies for effecting economic rationalization, and social and regional development programs of the kind discussed in earlier chapters of this report. Its success record in these new areas has been mixed, and its capabilities in economics and social science may need strengthening.
4. The appropriate balance between in-house research, sponsorship of research in universities and other research institutions, and contracting-out to private consultants

and others. This issue raises questions of continuity, flexibility and cost.

It is well recognized that effective management of the complex fisheries of Canada's Pacific coast requires a competent, energetic research capability. Productive fisheries research is also essential for maintaining up-to-date and progressive resource management: without the flow of new information and new ideas which are the products of

research, management is forced to forego attractive possibilities and to rely on outdated concepts; ultimately the full potential of the resource cannot be realized. This need for a vigorous research effort is widely accepted. The basic questions are, as always, how much research should be supported, what is the appropriate balance of research priorities, and who should be given responsibility for conducting it.

FOOTNOTES

1. Exhibit #63, p. 34.
2. R.S.C. 1979 c. 42.
3. Information provided by the Department of Fisheries and Oceans.
4. Exhibit #28, p. 12.
5. Exhibit #46, p. 18.
6. Donald Clough, Compliance Analysis for B.C. Fisheries Licensing and Resource Royalty Program. Prepared by Systems Engineering Associates Limited for the Department of Fisheries and Oceans. 1979.
7. This discussion of research draws heavily on "Research and Biological Activities," a background paper prepared for this Commission by the Department of Fisheries and Oceans. August 1981.

CHAPTER 14

Directions of Reform For The Future

"The B.C. fishing industry is in serious trouble at the present time. Because of the complexity of this industry, the present situation cannot be quickly resolved by one or two system changes. Instead, it will require hard work and responsible decisions by high quality managers for a period of years before any positive results will be apparent.

We would hope that this Commission will start this process happening, as the potential of the B.C. fishing industry is too great to be lost, both to our economy and to Canada as a nation."

THE PACIFIC COAST FISHING VESSEL OWNERS GUILD¹

The first chapter of this preliminary report emphasizes the need for a coherent policy to guide the future development of the Pacific fisheries. In subsequent chapters I have tried to outline the issues that must be dealt with in designing this policy framework, and have identified some of the means of coping with them.

The purpose of all this is to disentangle, and to put into some order, the myriad of complicated and interrelated problems relating to fisheries policy that have been referred to this Commission and which I must deal with in my final report. In summarizing the findings of the inquiry at this stage, this preliminary report represents a statement of progress to date. And by identifying opportunities for future policy, I hope to focus attention and discussion on alternative approaches to resolving the problems. This exercise is intended to assist participants in the inquiry, and me, in addressing the issues on which recommendations must be made in my final report.

As required by the Commission's terms of reference, I have made some specific preliminary recommendations in Part II concerning commercial fishing privileges. These proposals are substantial, but they deal only with certain urgent matters and leave much to be resolved in commercial fisheries regulation. My final recommendations on commercial fisheries policy will be influenced by responses to these interim proposals.

To provide further guidance to participants in this inquiry, I conclude this preliminary report with certain ten-

tative observations about the broad directions that fisheries policy should take. I have drawn these from the weight of evidence and advice presented to the Commission so far. They will, I hope, invite commentary and criticism, and may be subject to change in the light of further discussion.

Habitat management The protection and management of fish habitat must be regarded as a most fundamental concern of fisheries policy because, unless this responsibility is properly fulfilled, many other efforts toward reform will be wasted. Not only those with direct interest in the fisheries, but also the public at large, needs assurance that fish resources will be conserved and managed properly, and that the natural environment will be protected accordingly.

The most urgent need is to improve the policies and procedures for reconciling conflicts between protecting the environmental requirements of fish and developing other resources that affect fish habitat. This calls for improving the framework for cooperation between the federal and provincial agencies concerned with resource management and development; reducing duplication of effort especially between the federal Departments of the Environment and Fisheries and Oceans; clarifying the required standards for controlling pollution and disturbance of fish habitat; improving liaison with provincial agencies in the processes of planning, giving approvals and compiling data required for these purposes; correcting the deficiencies of legislation and regulations to enable these improvements; and strengthening enforcement procedures. Moreover, the habitat policy should be less single-mindedly concerned with protection than it has in the past, and should be more concerned with habitat management and enhancement. Some realignment of staff is also needed to improve effectiveness and efficiency.

Stock management and conservation In reviewing policy for managing fish stocks, special attention should be paid to three deficiencies. First, there is insufficient reliable information about the size and sustainable yield of many stocks to guide managers in establishing harvest levels. Second, there is insufficient information about the catches from particular stocks to properly regulate escapement requirements, especially for stocks that pass through more than one fishery. Third, the focus of management, which has heretofore been on particular stocks in isolation, should be redirected toward the interrelationships among species and stocks, and the effect that the exploitation of one stock has on the vitality of others.

Resource enhancement Enhancement of fish resources, especially salmon, should be an integral component of fisheries management. But more emphasis should be placed on solving four problems. One is the need to pay careful attention, when setting priorities, to the protection of wild stocks. This implies a more deliberate effort to balance artificial propagation with the rehabilitation of wild stocks and to select projects that will have the least adverse impact on other stocks. The second follows from the first; it is the

need to integrate more closely the administrative arrangements and activities of the government directed toward habitat management with those directed toward enhancement. Third, the time and location of harvesting enhanced stocks should be regulated to minimize adverse effects on natural stocks. Fourth, the involvement of the public, special interest groups and especially fishermen in enhancement activities should be expanded; this implies expanded activity on the part of Fisheries Officers, Community Advisors and professional staff. Other matters that must be resolved include the organizational structures for directing enhancement activities and the sources of funding.

Fleet management Unproductive investment and wasteful expansion of fishing capacity is the main obstacle to improved economic performance in the commercial fisheries. Fisheries policy must be reformed to provide much more effective means for ensuring that the size and structure of commercial fleets will evolve efficiently in future. It should be recognized that past efforts to control expansion of our major fleets by restrictions on gear, fishing time and on one or more dimensions of fishing vessels have not succeeded; nor, in view of the inherent deficiencies of these methods, are they likely to succeed in solving the long-run economic problems of the fisheries.

New methods must be found to dampen incentives to invest in redundant fishing capacity. Specifying fishing privileges in terms of catch quotas, recommended in this report for certain of our minor fisheries, offers considerable promise and deserves careful consideration for other fisheries as well. Royalties on the catch can also dampen incentives to invest in excess capacity, as well as providing an equitable method of raising resource revenues. Other measures that will contribute to fleet rationalization include removal of subsidies and tax incentives for vessel construction.

For fisheries that do not lend themselves to individual quotas, other methods must be found to promote fleet rationalization. Restrictive licensing of fishing capacity should be based on effective control of investment in fishing power and stringent vessel replacement rules. Removal of subsidies and tax incentives for vessel construction will also contribute to this goal. Wherever fleets are already overexpanded a buy-back program should be considered.

As commercial fishing fleets are reduced, attention must be paid as well to their structures, in terms of the composition of vessels and their gear. And fleet rationalization should be designed to minimize social and economic dislocation.

Management of fishing The long-term objective in managing the salmon fishery should be to shift fishing activity inshore. This implies reversing the trend towards intercepting fish earlier on their migration routes, often when they are less mature. The purpose of this general transition will be to improve the management of individual stocks, to raise yields, and to improve the economics of fish harvesting.

Three qualifications to this shoreward shift of fishing activity should be made. First, since certain species deteriorate in quality as they approach their spawning streams, harvesting them earlier in their migration routes may be warranted. Second, the high market value of certain species caught earlier in their life cycle and at certain times of the year may also justify fishing offshore. Third, until arrangements are firmly established between Canada and the United States regarding interception by one nation's fishery of stocks bound for the other's rivers, Canada may need to maintain offshore fishing in order to protect its long-term interests.

More fundamental methods of improving the harvesting of fish should also be considered. Rivermouth fisheries with land-based facilities and licenses or leases delegating the management and harvesting of fish resources within prescribed areas, perhaps linked with fish-farming and ranching operations, deserve careful consideration as a feature of long-run resource development.

In all fisheries, increased attention must be paid to the impact of various gear types on the genetic development of stocks through selection, on spawning behaviour and on fish habitat. Improved research in this area appears to be warranted.

Industrial structure Objectives relating to the desired pattern of integration, concentration and ownership in the primary and secondary sectors of the fishing industry should be clarified and provided for in an appropriate legal framework. The degree of independence of the fishing sector from the processing and marketing sectors should, at the very least, be maintained at current levels, but there might be advantages to strengthening it.

The public will be well served by orderly, stable and competitive fish buying and processing sectors. The regulatory environment should encourage production of products that generate maximum net returns to the Canadian economy. At present, at least, there appears to be no urgent need for more direct governmental involvement in fishing, fish processing or marketing.

Provisions for Indians The cultural and economic dependence of Indians on their traditional fisheries must be explicitly placed on a firm legal foundation. The participation of Indians in the commercial fishery should be protected and preferably increased. This objective, in the face of fleet reduction policies, will require special arrangements to preserve or increase Indian holdings of commercial fishing privileges.

Sportfishing Sportfishing on the Pacific coast unquestionably makes a valuable contribution toward our economic and social well-being, and it should be recognized as a legitimate and important use of fish resources. In general, fish should be available for sportfishing to the extent that the values they generate in this use are at least as high as they are in competing uses of the resource. Within this objective, policy should be aimed at preserving high-quality

sportfishing opportunities; the challenges we face in allocating a portion of the catch to this sector are in weighing the many intangible values associated with this use against the more measureable economic values generated by the competing commercial fisheries. And we must also consider the economic benefits associated with commercial sportfishing enterprises.

Fiscal arrangements The government should levy charges for the privilege of catching fish for commercial and recreational purposes, and these charges should be related as consistently as possible to the value of the resources used. In the long run, the fishery should be capable of yielding a net return to the people of Canada; for the foreseeable future, however, the revenues will be needed to help finance the costs of resource management and enhancement and, in the commercial sector, to rationalize the fleets.

Direct and indirect subsidies to the fishing industry should be abolished, except where they serve a well-defined and urgent need. This may include, for example, assistance to strengthen Indian participation in commercial fishing, but it notably excludes any general support for vessel construction.

Research and statistics Our present knowledge about fish resources and their use is seriously inadequate for effective management, especially in view of the heavy and increasing demands on them. This deficiency must be corrected. Statistical information systems should complement other administrative requirements as far as possible: the licensing of sportfishermen and recordings of commercial landings are examples of measures that will complement revenue and management needs. To improve field management of the fisheries, more test-fishing, tagging and spawning ground enumeration will be required. And for long-term resource management, more research is necessary on the biology of stocks, the impacts of gear on genetic development, the effects of environmental changes and methods of alleviating them.

Administration and consultation The administrative organization of the Department of Fisheries and Oceans needs to be streamlined, and particular programs, such as habitat management, enforcement and research, need to be strengthened. This will call for increased manpower, espe-

cially in the field, and improved training and personnel policies. Careful attention to priorities, to reducing duplication of effort, and to the design of a less troublesome regulatory framework will alleviate the burden on the public service and the need to expand it.

As explained in earlier chapters, methods of allocating commercial fishing privileges that encourage operational efficiency are likely to be administratively less burdensome and more effective in controlling fleet expansion than current methods that run counter to the economic incentives of fishermen and vesselowners. Legislation and regulations that provide clear objectives, guidelines and procedures to field officers in regulating fishing and incursions on fish habitat can reduce the burden on those affected as well as on administrators.

Systematic guidelines can also minimize the pressures on the Department to protect each user group from the others, and to become excessively preoccupied with satisfying users at the expense of managing the resource and ensuring that it is utilized properly. And enforcement can be facilitated by measures that promote self-policing through user group involvement in, and commitment to, resource management activities. The substantial opportunities to reduce administrative and enforcement burdens through re-directing incentives and mustering the cooperation of users should be fully exploited to buttress strengthened administrative capabilities.

A restructuring of the advisory process also appears to be needed along with a reorientation of many of the present advisory groups. Special attention should be given to the method of selecting advisors in order to avoid tendencies to use advisory committees to promote special interests and instead to provide broadminded policy advice.

These are admittedly very general propositions, but they suggest broad directions for constructive reform in fisheries policy. Alternative strategies for applying them are discussed in the preceding chapters of this report. It is now the Commission's task to modify and amplify them in the light of further evidence and advice and to translate them into a coherent package of recommendations for policy change. I hope to complete this task within a few months with the continued cooperation and guidance of participants in this public inquiry.

FOOTNOTES

1. Exhibit # 120, p. 19.

APPENDIX A

The Commission's Terms of Reference

The following is the text of the Commission appointing Dr. Peter Pearse Commissioner under Part I of the Inquiries Act.

TO ALL TO WHOM these Presents shall come or whom the same may in anyway concern,

GREETING:

WHEREAS pursuant to the provisions of Part I of the Inquiries Act, chapter I-13 of the Revised Statutes of Canada, 1970, His Excellency the Governor General in Council, by Order in Council P.C. 1981-60 of the twelfth day of January in the year of Our Lord one thousand nine hundred and eighty-one has authorized the appointment of Our Commissioner therein and hereinafter named to examine into, report upon and make recommendations concerning the condition, management and utilization of the fisheries of the Pacific coast of Canada, excluding the arrangements between Canada and foreign nations governing fishing rights and conservation of stocks, and, without limiting the generality of the foregoing, to inquire into and report upon:

- (a) the condition of the stocks of fish within Canada's jurisdiction off the Pacific coast, current levels of utilization and their relationship to optimum rates of use;
- (b) the provisions for conservation, management, protection and development of the fish resources, including the protection of their tidal and non-tidal habitat and the enhancement of salmonid stocks;
- (c) the structure and size of the commercial fishing fleet and the relationship between the capacity of the fleet to harvest fish and the optimum rates of harvesting the stocks;
- (d) the policies and procedure for licensing commercial fishing, and for regulating the size and structure of the fishing fleet, including the charges to be levied by the Crown for fishing privileges; and
- (e) the nature and amount of non-commercial fishing in tidal waters and non-tidal waters for salmonid species, its impact on the stocks and on the

commercial fishery, and the policies and procedures for regulating non-commercial fishing.

NOW KNOW YOU that, by and with the advice of Our Privy Council for Canada, We do by these Presents nominate, constitute and appoint Dr. Peter Pearse, of the City of Vancouver, in the Province of British Columbia, to be Our Commissioner to conduct such inquiry.

TO HAVE, HOLD, exercise and enjoy the said office, place and trust unto the said Peter Pearse, together with the rights, powers, privileges and emoluments unto the said office, place and trust of right as by law appertaining during Our Pleasure.

AND WE DO HEREBY require Our said Commissioner to make recommendations directed toward ensuring that the public interest is protected in the legislation, policies, procedures and practices affecting the management and use of the fish resources and in particular:

- (a) that fish resources and their use make the highest possible contribution to the economic and social development of the people of Canada, especially of those resident on the Pacific coast of Canada, recognizing that this contribution may be realized in economic, recreational and other social forms;
- (b) that granting of fishing privileges to commercial, recreational and native food fishermen is conducive to proper management and conservation, to an equitable division of the catch among sectors, and to economic efficiency in the development of the commercial fishing fleet;
- (c) that charges levied by the Crown for rights to fish commercially, or to land fish, are consistent with the value of the resources recovered, after fair and reasonable returns to commercial fishing enterprises;
- (d) that vigor of the fishing industry is maintained and advanced, and its structure, ownership and control is consistent with industrial efficiency; and
- (e) that provisions for management, enhancement and protection of the fish resources, for the administration of fisheries policy, and for consultation and communication between the Government of Canada and private groups involved in fishing activity are systematic and efficient.

AND WE DO HEREBY authorize Our said Commissioner

- 1. to adopt such procedures and methods as the Commissioner may from time to time deem expedient for the proper conduct of the inquiry;
- 2. to sit at such times and in such places in the Province of British Columbia or elsewhere in Canada as may be required;
- 3. to exercise all the powers conferred upon him by section 11 of the Inquiries Act;
- 4. to engage the services of such staff and technical advisers, including counsel, as he deems necessary or advisable to aid him in the conduct of the inquiry at such rates of remuneration and reimbursement as may be approved by Treasury Board;
- 5. to rent office space and facilities for public hearings in cooperation with the federal Department of Public Works as he may deem necessary at such

rental rates as are consistent with the policies of the Department of Public Works;

AND WE DO FURTHER require Our said Commissioner to make a preliminary report to the Governor in Council not later than the first day of August, 1981, with recommendations dealing specifically with policies and procedures for regulating access to the fisheries and the development of the commercial fishing fleet, and also with the administration of licences and levies for commercial fishing privileges.

AND WE DO FURTHER require Our said Commissioner to make a final report to the Governor in Council, including such portions of the preliminary report as may be necessary, not later than the thirty-first day of December, 1981.

AND WE DO FURTHER require Our said Commissioner to file with the Dominion Archivist the papers and records of the inquiry as soon as reasonably may be after the conclusion of the inquiry.

AND WE DO FURTHER advise that Our said Commissioner be assisted by the officers and employees of the departments and agencies of the Government of Canada in any way the Commissioner may require for the conduct of the inquiry.

IN TESTIMONY WHEREOF, We have caused these Our Letters to be made Patent and the Great Seal of Canada to be hereunto affixed.

WITNESS:

Our Right Trusty and Well-beloved Edward Richard Schreyer, Chancellor and Principal Companion of Our Order of Canada, Chancellor and Commander of Our Order of Military Merit upon whom We have conferred Our Candian Forces' Decoration, Governor General and Commander-in-Chief of Canada.

AT OUR GOVERNMENT HOUSE, in Our City of Ottawa, this third day of March in the year of Our Lord one thousand nine hundred and eighty-one and in the thirtieth year of Our Reign.

BY COMMAND,

(signed)
Governor General of Canada
Deputy Registrar General
Deputy Attorney General

APPENDIX B

Preliminary List of Exhibits and Registered Participants in the Commission's Public Hearings

exhibit number	registered participant	witness	presentation	date (1981)
5.	G. Cadorin	G. Cadorin	Nanaimo	April 8
6.	Ganges Fishermen's Association	R. Coulter	Nanaimo	April 8
7.	R. Larson	R. Larson	Nanaimo	April 8
8.	Nanaimo and District Fish and Game Protective Association	W.R. Harling	Nanaimo	April 8
9.	J.G. Sanderson	J.G. Sanderson	Nanaimo	April 8
10.	Concerned Fisherman's Committee of the Sunshine Coast	K.H. Griffith	Nanaimo	April 8
11.	Nanaimo Indian Band	J. Brown O. Thomas E. Light	Nanaimo	April 8
12.	R. Arnet	R. Arnet	Port Alberni	April 8
13.	Regional District of Alberni-Clayoquot	A.E. Kilpatrick P. Barr R. Burley P. Garcia	Port Alberni	April 10
14.	Ucluelet-Port Albion Chamber of Commerce	R. Davison	Port Alberni	April 10
15.	Nuu-Chah-Nulth Tribal Council	G. Watts A. Franks	Port Alberni	April 10
16.	A. Vanderhorst	A. Vanderhorst	Port Alberni	April 10
17.	A. Gallagher	A. Gallagher	Prince Rupert	April 22
18.	S.R. Brinton	S.R. Brinton	Prince Rupert	April 22
19.	Prince Rupert Fish Exchange	G. Lindquist	Prince Rupert	April 22
20.	D.W. Ellis	D.W. Ellis	Prince Rupert	April 22
21.	Northern Trollers' Association	J. Broadhead M. Hearne M. Forand	Prince Rupert	April 23

exhibit number	registered participant	witness	presentation	date (1981)
22.	United Fishermen and Allied Workers	C. Wyllie	Prince Rupert	April 23
22a	Union-Shoreworkers Local #31	B. Hale		
22b		B. Thompson		
		J. Hartney		
		J. Thorkelson		
23.	Prince Rupert Fishing Vessel Owners Association	G. Haugan	Prince Rupert	April 24
		D. Murray		
24.	United Fishermen and Allied Workers Union Local #37	M. Darnell	Prince Rupert	April 24
25.	Prince Rupert Rowing and Yachting Club	O. Stuart	Prince Rupert	April 24
26.	G. Logan	G. Logan	Prince Rupert	April 24
27.	W. Markin	W. Markin	Vancouver	April 27
28.	D. Pepper	D. Pepper	Vancouver	April 27
29.	Fraser River Coalition	W. Paulik	Vancouver	April 27
		J. Vance		
30.	B.C. Wildlife Federation	D.D. McDermid	Vancouver	April 28
		B. Otway		
31.	A. Kaario	A. Kaario	Vancouver	April 28
		L. Iverson		
32.	Port Coquitlam and District Hunting and Fishing Club	H. Prante	Vancouver	April 28
33.	D.R. Boyes	D.R. Boyes	Vancouver	April 28
34.	K. Anders	K. Anders	Vancouver	April 28
35.	O.B. Ogmundson	O.B. Ogmundson	Victoria	May 13
36.	Gulf Islands Independent Fishermen's Association	A.H. Reynolds	Victoria	May 13
37.	Canadian Federation of Independent	B. Morrison	Victoria	May 13
37a	Business			
37b				
37c				
38.	P.D. Hancock	P.D. Hancock	Victoria	May 13
39.	A. Merriman	A. Merriman	Victoria	May 14
40.	The Cowichan Estuary Preservation Society	B. Meagher	Victoria	May 14
41.	A.D. de Leeuw	A.D. de Leeuw	Victoria	May 14
42.	Laredo Charters Ltd.	J. Chudyk	Victoria	May 14
43.	J.K. Watson	J.K. Watson	Victoria	May 14
44.	H. and L. Doerksen	H. Doerksen	Victoria	May 15
44a		L. Doerksen		
44b		D. Doerksen		
44c				
45.	Royal Canadian Navy Anglers' Association	R.J. Rogerson	Victoria	May 15
46.	A.H. Meadows	A.H. Meadows	Victoria	May 15
47.	Amalgamated Conservation Society	S. D'Agati	Victoria	May 15
		W. Zaccarelli		
		R.J. Rogerson		
48.	Steelhead Society of B.C.	J. Counts	Terrace	May 21
48a		J. Culp		
48b		M. Whateley		
49.	Kitamaat Village Council	G. Amos	Terrace	May 21
		T. Robinson		

exhibit number	registered participant	witness	presentation	date (1981)
50.	Skeena Protection Coalition of Terrace	E. Hamilton	Terrace	May 21
51.	D.E. Dobyns	D.E. Dobyns R. Jones	Terrace	May 21
52.	Gitksan-Carrier Tribal Council	A. Joseph	Hazelton	May 23
52a		C. White		
52b		B. Patsey		
52c		R. Morgan T. Brown P. Grant S. Clark P. Williams G. Sebastian M. Morrell R. Overstall		
53.	Save the Bulkley	W. Metcalfe	Hazelton	May 23
53a		H. Kusselbrink P. Moss		
54.	Fraser River Gillnetters Committee	J. Anderson W. Probert P. Carlson	Delta	May 25
55.	G. Dalum	G. Dalum	Delta	May 25
56.	Original 'B' Fishermen's Association	W.G. Thomson	Delta	May 25
57.	Richmond Rod and Gun Club	J.L. Hargrove	Delta	May 25
58.	Columbian Company Ltd.	R.D. Taylor	Delta	May 26
59.	Fish Incorporated	J. Margetis	Delta	May 26
60.	B. Alden	B. Alden W. Paulik	Delta	May 26
61.	E. and W. Burnell	E. Burnell W. Burnell	Delta	May 26
62.	F. and L. Buble	F. Buble L. Buble	Delta	May 27
63.	Fisheries Association of B.C.	J.N. Spitz	Delta	May 27
63a		E. Safarik Jr. E.L. Harrison B. Buchanan S. Ishiguro		
64.	Ocean Fisheries	E. Safarik	Delta	May 27
65.	S. Jovick	S. Jovick	Delta	May 27
65a				
65b				
66.	Greenpeace Foundation of Canada	P. Moore	Delta	May 28
66a				
67.	D. Williams	D. Williams	Delta	May 28
67a				
67b				
68.	D. Dawson	D. Dawson	Delta	May 28
69.	T.G. Hodgson	T.G. Hodgson	Delta	May 28
70.	Pacific Gillnetters Association	S.I. Taylor D. McEachern D. Ekroth M. Forest	North Vancouver	June 3

exhibit number	registered participant	witness	presentation	date (1981)
71.	B.C. Chamber of Commerce	O.I. Eidsvik B. McDonald	North Vancouver	June 3
72.	Council of B.C. Yacht Clubs	D. Simpson	North Vancouver	June 3
73.	Canadian Fishing Company	D. Miller	North Vancouver	June 4
74.	E. Tassonyi	E. Tassonyi	North Vancouver	June 4
75.	Oweekeno Indian Band	C. Hanuse	North Vancouver	June 4
75a		D. Smith		
76.	Pacific Coast Salmon Seiners Association	K. Brillon C. Doyle T. Assue	North Vancouver	June 4
77.	Pacific Trollers Association	G. Bisaro	Vancouver	June 5
77a		D. Williams J. Garcia		
78.	T. Howard	T. Howard	North Vancouver	June 5
79.	E. Pinkerton	E. Pinkerton	North Vancouver	June 5
80.	The Sechelt Nation		Powell River	June 11
81.	Tidal Rush Marine Farms	B. Hope	Powell River	June 11
82.	Powell River Anti-Pollution Association	M. Rossander F. Jenkinson J. Michael M. Conway-Brown	Powell River	June 11
83.	The Letwiltouch, Komoux and Kwalikum People, Campbell River, Cape Mudge, Comox/Qualicum Branches of the Native Brotherhood of B.C.	R. Naknakin H. Assu S. Assu J. Rivard G. Quoksister R. Clifton	Campbell River	June 12
84.	United Fishermen and Allied Workers' Union	F. Pearson	Campbell River	June 12
84a				
85.	Gulf Trollers' Association	B. McLeod	Campbell River	June 12
86.	T. Northcott	T. Northcott	Campbell River	June 13
87.	Monenco Consultants Pacific Ltd.	D.R. Wilson	Campbell River	June 13
88.	B. Thornton	B. Thornton	Campbell River	June 13
88a				
88b				
89.	Kwakiutl District Council	E. Willie	Port Hardy	June 19
89a		F. Willie		
89b		B. Joseph B. Ambers B. Duncan		
90.	Kwakiutl Band	R. Wilson	Port Hardy	June 19
91.	Fisheries Council of Canada	K.M. Campbell	Vancouver	June 23
92.	Cariboo Lumber Manufacturers' Association	J.M. Taylor B. Howard	Vancouver	June 23
93.	Mr. R. and Mrs. L. Long	G.R. Long	Vancouver	June 23
93a		L. Long		
93b		R. Bose		
93c				
93d				
93e				

exhibit number	registered participant	witness	presentation	date (1981)
94.	Fishing Vessel Owners' Association	L.M. Souza J. Brajcich J. Lenic	North Vancouver	June 24
95.	Association of British Columbia Professional Foresters	J.W. Toovey W.A. Hopewood P.W. Ackhurst	North Vancouver	June 24
96.	Association of Professional Biologists of British Columbia	G. Gaine	North Vancouver	June 24
97. 97a	Sport Fishing Institute of British Columbia	D. Elliot G. Kristianson R. Peterson	North Vancouver	June 25
98.	B.C. Packers Limited	E.L. Harrison J. Buchanan D. Nelson P. Todd R. Shelley	North Vancouver	June 25
99.	L. Straight	L. Straight	North Vancouver	June 25
100. 100a 100b 100c	B.C. Development Corporation	P. Breikss F. Culbert D. Sinclair	North Vancouver	June 26
101.	Vancouver Shell Fish and Fish Company Ltd.	N.E. Safarik	North Vancouver	June 26
102.	Salmonid Enhancement Task Group	G. McKnight J. Sewid T. Murray R. Lotzkar	North Vancouver	June 26
103.	Progressive Conservative Caucus Pacific and Inland Fisheries	T. Siddon, M.P. P. Carney, M.P.	North Vancouver	June 30
104.	B.C. Forest Products	W.G. Burch S. Techy B. Willington	North Vancouver	June 30
105.	C.W. Ross	C.W. Ross	North Vancouver	June 30
106. 106a	Squamish Indian Band	B. Williams D. Jacobs R. Williams	North Vancouver	June 30
107.	B.C. Wildlife Federation	H. English	Victoria	July 8
108.	C.R. White	C.R. White	Victoria	July 8
109. 109a	W.R. Perrey	W.R. Perrey	Victoria	July 8
110.	Marine Trades Association	B. Gibson	Victoria	July 9
111.	The Honourable Jack Davis	J. Davis	Victoria	July 9
112. 112a	A. Reder	A. Reder W.F. Dyke	Victoria	July 9
113. 113a 113b 113c	Victoria Charter Boat Association	R.C.K. Peers R. Wright J. Gilbert	Victoria	July 13
114.	Wilson and Lenfesty Ltd.	D. Breel	Victoria	July 13

exhibit number	registered participant	witness	presentation	date (1981)
115.	Tackle Manufacturers Association of Southern Vancouver Island	B.J. Scott B. Hodson T. Davis J.K. Homer J. Gaunt J. Gilbert	Victoria	July 13
116. 116a	Allied Boating Association of Canada	D. Matheson	Victoria	July 14
117.	Victoria Fish and Game Protective Association	A. Playfair A. McGregor J. Clements	Victoria	July 14
118.	Sidney Anglers' Association	T.C. Davis	Victoria	July 14
119.	D.W. Munro, M.P.		Victoria	July 14
120.	Pacific Coast Fishing Vessel Owners Guild	E. Wickham	Victoria	July 15
121.	A. Gallagher	A. Gallagher	Prince Rupert	July 21
122.	Bella Coola Band Council	L. Pootlass S. Schooner M. Hall D. Schooner R. Andy	Prince Rupert	July 21
123.	B. Pattinson	B. Pattinson	Prince Rupert	July 21
124.	Prince Rupert Fish Exchange	J. Rowbottom	Prince Rupert	July 22
125. 125a 125b	Masset Band Council	F. Collinson T. Greene	Prince Rupert	July 22
126.	W.A. Lenz	W.A. Lenz	Prince Rupert	July 22
127.	Nechako Neyenkut Society	L. Burgener	Prince Rupert	July 23
128.	Prince Rupert Fishermen's Co-operative	M. Cat A. Laing P. Greene N. Marshall D. Proctor B. Shumka	Prince Rupert	July 23
129. 129a 129b 129c 129d 129e	Nishga Tribal Council	J. Gosnell R. Robinson H. Haldane H. Doolan P. McCart M. Shaffer G. Holman H. Stevens H. McKay J. Gosnell D. Rosenbloom	Prince Rupert	July 24
130.	The Anglican Church of Canada	P. Hamel	Prince Rupert	July 14
131.	The Anglican Diocese of Caledonia, The Anglican Diocese of Yukon	H. Haldane J. Spear J. Stokes F. Lewis D. Bobs I. MacKenzie		

exhibit number	registered participant	witness	presentation	date (1981)
132.	Institute of Naval Architects of British Columbia	L. Coward D. Moore B. MacDonald	Vancouver	July 27
133.	Union of B.C. Indian Chiefs	S. Terry W. Haimila	Vancouver	July 27
134.	S. Fuller	S. Fuller	Vancouver	July 27
135.	Council of Forest Industries of British Columbia	G. Ainscough P. Gilbert J. Bonnerman M. Mosher B. Sen R. Urban	Vancouver	July 28
136.	New Democratic Party Caucus	T. Miller, M.P.	Vancouver	July 28
137.	Western Canada Wilderness Committee	P. George	Vancouver	July 28
138.	United Fishermen and Allied	J. Nichol	Vancouver	July 29
138a	Workers Union	G. Hewison W. Procopation		
139.	Central Native Fishermen's Cooperative	A. Dixon	Vancouver	July 29
140.	D. Ferguson	D. Ferguson	Vancouver	July 30
141a	Native Brotherhood of British Columbia Volume I	E. Newman R. Naknakin J. Rivard	Vancouver	July 30
141b	Native Brotherhood of British Columbia Volume II	D. Pepper T. Knowles B. Clifton V. Kramner C. Atleo G. Joseph		
142.	Heiltsuk Tribal Council	E. Newman A. Dixon C. Martin D. Halsted	Vancouver	July 30
143.	Department of Fisheries and Oceans	W. Shinnars	Vancouver	July 31
143a	(Licensing Brief)	A. Gibson P. Murray W. Grider D. Reid D. Carson		

Communities in which informal meetings were held:

location	date (1981)
Masset	March 27
Queen Charlotte City	March 28
Lillooet	April 4
Alert Bay	April 14
Oweekeno	May 6
Bella Coola	May 6
Bella Bella	May 7
Ucluelet	May 9
Ahousaht	May 11
Kispiox	May 22
Sechelt	June 10
Stuart Island	June 15
Pedder Bay	July 10
Lytton	July 17

Registered Participants who have not yet appeared:

registered participant	witness	location
Aluminum Company of Canada Ltd.	W.J. Rich	Vancouver
American Fisheries Society	C.W. Chestnut	North Vancouver
H. Burrow	H. Burrow	Crofton
Council for Yukon Indians	D. Rosenbloom	Vancouver
Desolation Sound Tribal Council	J. Mitchell	Powell River
J. Fulton, M.P.	J. Fulton	Ottawa
D. Gillespie	D. Gillespie	Telkwa
D. Gomez	D. Gomez	Prince Rupert
S. Hamilton	S. Hamilton	Sointula
Kwa Wa Aineuk Band	E. Williams	Sullivan Bay
Kwicksutaineuk Band	P. Smith	Gilford Island
Kyuquot Nation	K. John	Kyuquot
MacMillan Bloedel Limited	J.H. Lawson	Vancouver
Mamellilikull Band	D. Mountain	Campbell River
J. Manly	J. Manly	Ottawa
Ministry of Environment	A. Murray	Victoria
E. Neish	E. Neish	Victoria
Nimpkish Indian Band	R. Cramner	Alert Bay
Nimpkish Indian Band	M. Jackson	Vancouver
	M. Weinstein	
Pacific Herring Gillnetters Assoc.	R.B. Reeve	Saanichton
Regional District of Kitimat-Stikine	A. Webber	Terrace
Richmond Anti-Pollution Association	W. Paulik	Richmond
B.M. Rowe	B.M. Rowe	Comox
T. Russell	T. Russell	Coal Harbour
Saltstream Engineering Ltd.	R. Smeal	West Vancouver
Sekanni Carrier Tribal Council		Fort St. James
South Island District Council	T. Sampson	Brentwood Bay
J. Stevens	J. Stevens	Delta
Terrace Concerned Sports Fishermen	M. Warner	Terrace
Trans-Pacific Fish Ltd.	I. Todd	Richmond
	B.L. Tyrer	
Truck Loggers Association	E.R. Preus	Vancouver
Tsawataneuk Band Council	F. Willie	Kingcome Inlet
United Fishermen and Allied Worker's Union, Local 27	R. Loosmore	Bella Coola
Yukon Conservation Society	M. Fraser	Whitehorse

